L H-14

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

IMMEDIATE

Dick McCormack
Headquarters. Washington, D.C.
(Phone: 202/755-8583)

Don Witten
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/982-4955)

RELEASE NO: 78-26

NASA TO LAUNCH OSCAR-D, EIGHTH RADIO AMATEUR SATELLITE

When a Delta launch vehicle lifts off the pad at the Western Test Range near Lompoc, Calif., in early March to deliver the Landsat C Earth resources satellite into orbit, two smaller passengers will ride along. (See: NASA Headquarters release No: 78-22, Landsat C Press Kit.) One of these will be an amateur radio communications satellite named OSCAR-D. The other is the Plasma Interaction Experiment (PIX), developed by NASA's Lewis Research Center, Cleveland, Ohio.

OSCAR-D will be the eighth in a series of space satellites built by radio amateurs to be placed in orbit as piggyback payloads by U.S. launch vehicles.

-more-

Mailed:
February 22, 1978

OSCAR is the acronym for Orbiting Satellite Carrying Amateur Radio. OSCAR 1, launched in December 1961 was a simple, battery operated radio beacon. Subsequent OSCARs have evolved into long lived communications relay satellites available for use by amateur operators around the world.

OSCAR 6, launched with the ITOS-D in October 1972 operated successfully in orbit for four and one-half years before ceasing to transmit in June 1977. OSCAR 7, launched with ITOS-G in November 1974, continues to function well and is heavily used both for amateur communications and as an educational tool bringing space science and applications into the classroom.

Using curriculum material provided by the American Radio Relay League and assistance from local amateur radio operators, science teachers in school systems throughout the country are being provided an opportunity to give their students a direct hands-on experience working with their own space satellite.

By building simple ground stations, making orbital predictions and operating with the satellites, students are being challenged to develop their skills in science and mathematics while experiencing the excitement of space communications.

Other applications with OSCAR satellites have included small terminal, multiple-access communications experiments; emergency communications exercises; and early tests of the search and rescue location systems currently under development by NASA.

OSCAR-D, to be designated OSCAR 8 once in orbit, is intended as a replacement for OSCAR 6 and will be used for continuation and expansion of the educational program. It is a small solar powered spacecraft, rectangular in shape, weighing 27 kilograms (60 pounds) and containing two communications transponders along with command and telemetry systems. Both transponders use the same uplink frequency passband centered on 145.9 MHz but employ different downlink frequencies with passbands centered on 29.4 MHz and 435.1 MHz. Because of power limitations, plans call for operating only one transponder at a time. Spacecraft stabilization is provided by permanent magnets and permalloy hysteresis damping rods.

OSCAR-D was developed under the auspices of the Radio Amateur Satellite Corp. (AMSAT) in cooperation with the American Radio Relay League, Inc. AMSAT is an international, non-profit organization of radio amateurs based in Washington, D.C., that has been responsible for the last four OSCAR satellites.

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OSCAR-D is the product of a cooperative effort by amateur groups in the U.S., Canada, West Germany and Japan.

Additional information about AMSAT may be obtained by contacting the organization directly through Post Office Box 27, Washington, D.C. 20044.

Full information about the OSCAR educational program can be obtained by writing the American Radio Relay League, Newington, Conn. 06111.

Photographs and drawings to illustrate this news release will be distributed without charge only to media representatives in the United States. They may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
Washington, D.C. 20546

Telephone No: 202/755-8366 Photo Nos: 78-H-39
78-H-40

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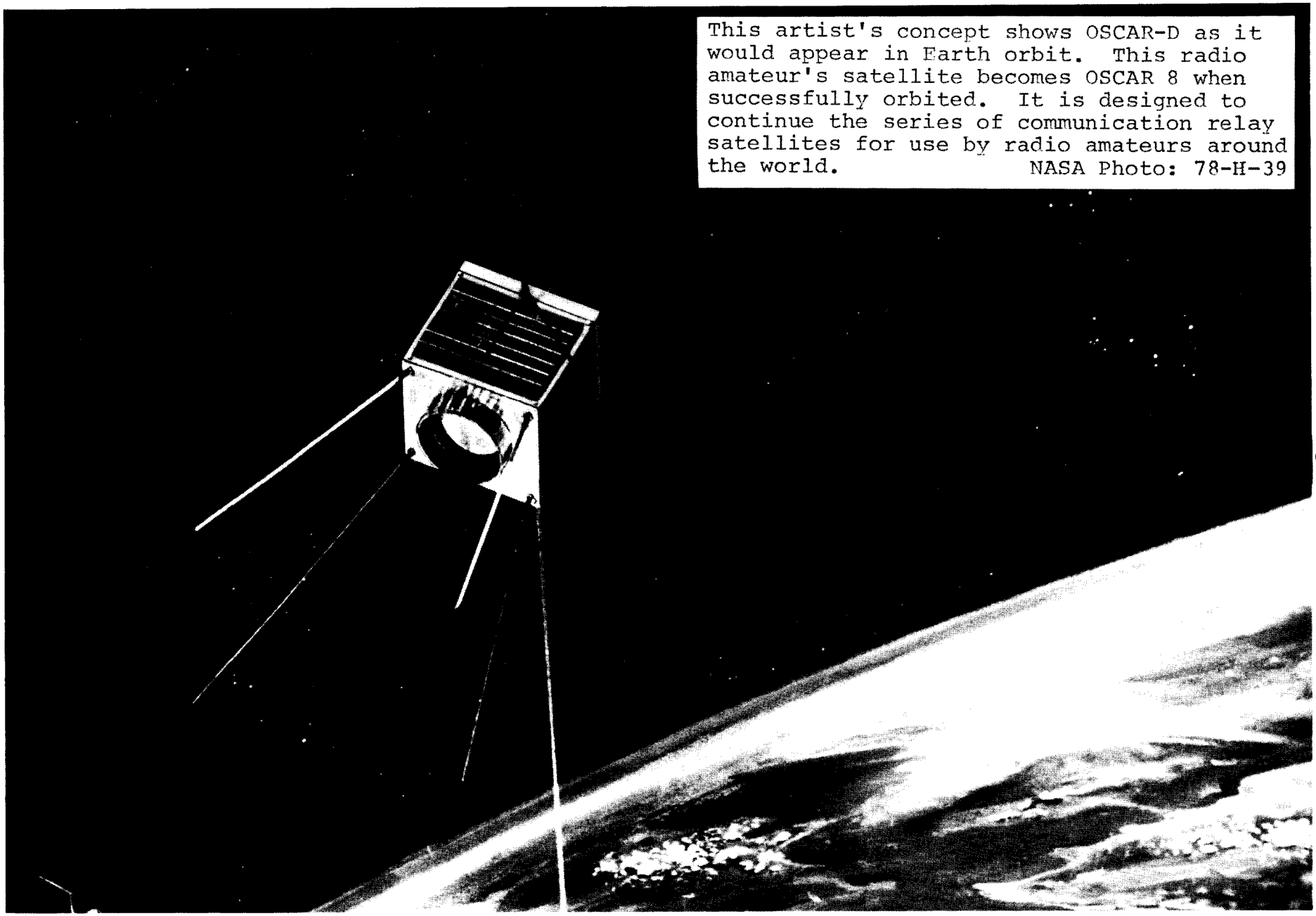
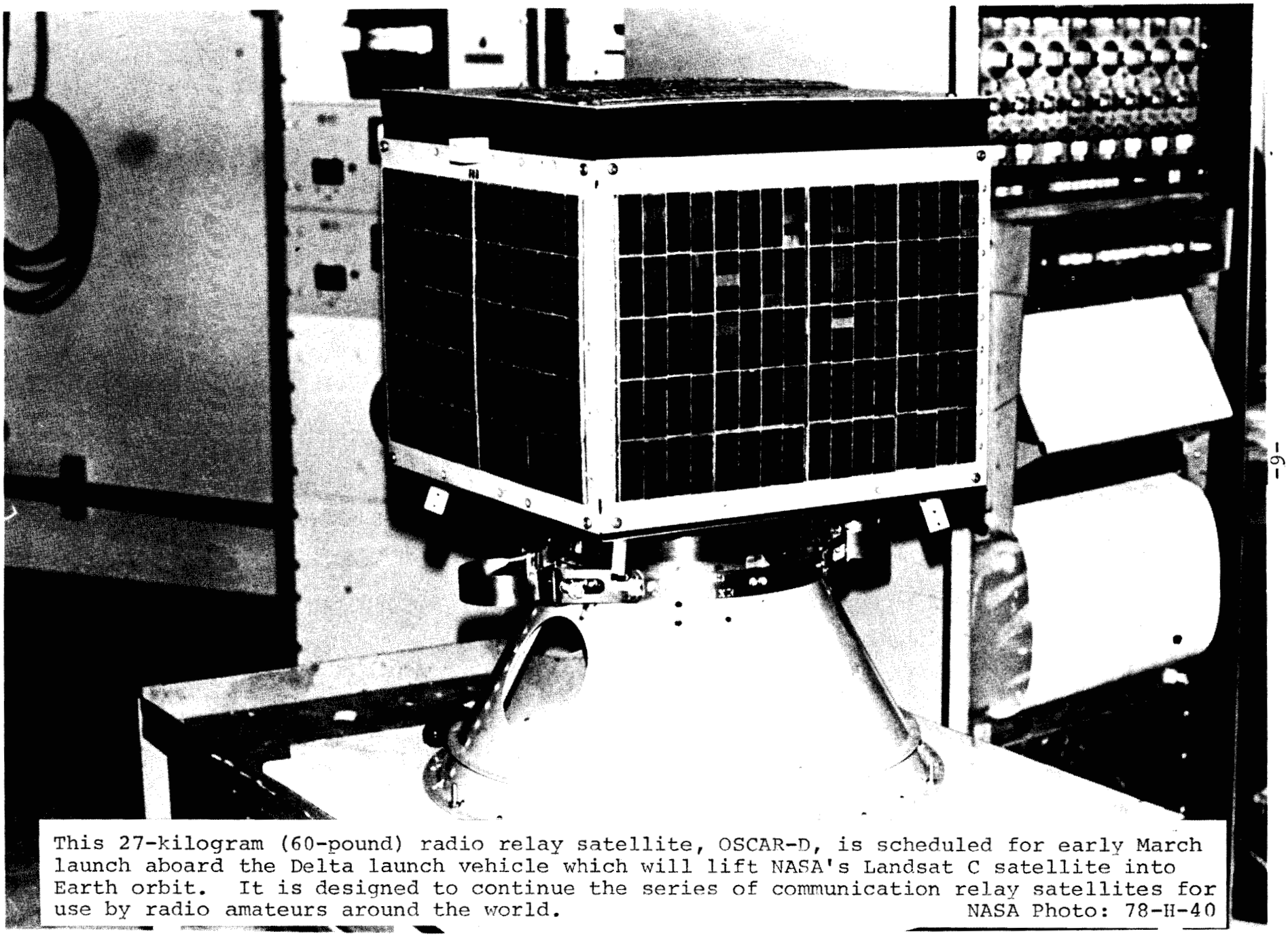


This artist's concept shows OSCAR-D as it would appear in Earth orbit. This radio amateur's satellite becomes OSCAR 8 when successfully orbited. It is designed to continue the series of communication relay satellites for use by radio amateurs around the world. NASA Photo: 78-H-39



This 27-kilogram (60-pound) radio relay satellite, OSCAR-D, is scheduled for early March launch aboard the Delta launch vehicle which will lift NASA's Landsat C satellite into Earth orbit. It is designed to continue the series of communication relay satellites for use by radio amateurs around the world.

NASA Photo: 78-H-40

NASA News

National Aeronautics and
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Washington, D.C. 20546
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For Release:

IMMEDIATE

Donald Zylstra
Headquarters, Washington, D.C.
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RELEASE NO: 78-27

NASA SELECTS GTE TO PROVIDE TELEPHONE SERVICES AT KENNEDY CENTER

NASA has selected GTE Automatic Electric, Northlake, Ill., to install, maintain and operate an administrative telephone system at the agency's Kennedy Space Center in Florida. The fixed-price contract calls for a one-year lease of the system with nine one-year options and, including the associated maintenance and operation, is valued at $12.7 million for the 10-year period. The contract also includes an option to purchase the system.

The automatic dial telephone system will include basic switching equipment, telephones, cabinets, switch boards and consoles, interior wire and cable, and any ancillary equipment necessary for proper operation of the system.

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Mailed:
February 21, 1978

The existing system with more than 6,150 telephones now in use is owned by the Southern Bell System and was installed in 1963. Transition to the new system is scheduled for 22 months from the date of the contract.

Other proposals for the system were submitted by Southern Bell Telephone and Telegraph Co., Kennedy Space Center, Fla.; Independent Business Telephones, Tampa, Fla.; and Northern Telecom, Inc., Nashville, Tenn.

Kennedy Center has been designated the prime launch and recovery site of the reusable Space Shuttle, scheduled for its first manned orbital flight in 1979. Besides manned spacecraft, Kennedy Center launches numerous unmanned communications, weather and scientific satellites and spacecraft from its facilities in Florida and from Vandenberg Air Force Base, Calif.

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LH-14

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For Release:

IMMEDIATE

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RELEASE NO: 78-29

NASA SATELLITE TO TRACK NORTH POLE EXPEDITION

A NASA meteorological research satellite -- Nimbus-6 -- will track the 6,000-kilometer (3,728-mile) journey of a lone Japanese explorer venturing by dog sled from northern Canada to the North Pole and return, traveling the length of Greenland's isolated interior. The six-month journey is scheduled to start March 4, 1978.

NASA's Goddard Space Flight Center, Greenbelt, Md., is undertaking the tracking task at the request of the Smithsonian Institution which has a scientific stake in the venture.

-more-

Mailed:
February 24, 1978

The explorer is 37-year-old Naomi Uemura of Tokyo whose Arctic experience includes driving a dog sled solo some 12,000 km (7,457 mi.) from Greenland to Alaska in 1975 and 1976 over an 18-month period. In preparation for that trip, he had lived for a year in a Greenland Eskimo community to learn dog handling techniques and how to survive the hostile Arctic.

Uemura is also an accomplished mountain climber, having conquered the highest peaks in five continents. He scaled them all alone with the exception of Mt. Everest, which he successfully climbed as part of a team escort. He has also sailed alone on a raft 6,000 km (3,728 mi.) down the Amazon River.

During his upcoming Arctic journey, Uemura will carry a 4.5-kilogram (10-pound) satellite beacon package on his dog sled. This battery-powered unit will transmit a radio signal automatically once a minute. Included in the signal will be the local temperature and atmospheric pressure.

The radioed signals will be monitored by the Nimbus-6 satellite which overflies the poles once every 108 minutes an an altitude of 965 km (600 mi.). Data collected by the satellite will be relayed by a NASA tracking station in Fairbanks, Alaska, to Goddard Center.

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There, the position of the dog sled will be computed automatically. All data will be available to the Smithsonian at least once every 12 hours.

Uemura will take systematic snow, ice and air samples for Japan's National Institute of Polar Research and the Water Research Institute of the Nagoya University, Japan. He also will record possible evidence of past habitation in northern Greenland.

"We are particularly anxious to have as accurate a record as possible of Uemura's daily positions for correlation with the collected data," said Dr. Lee Houchins, the Smithsonian's principal investigator from the Museum of History and Technology.

"The satellite tracking data will be of further value to us in evaluating Uemura's dead reckoning and celestial navigation techniques, a particularly difficult task in the polar regions," added Dr. Houchins.

Uemura will depart for the North Pole from a camp near Alert on Cape Columbia, Ellesmere Island, in Canada's remote Northwest Territories. Following Admiral Peary's 1909 route, he expects to reach the Pole by mid-April after travelling 800 km (497 mi.).

From the North Pole, the Japanese explorer will strike out for the northern tip of Greenland, with hopes of arriving there by June 1. This portion of the journey will equal the first leg in distance.

Using mountain climbing techniques, Uemura will work his way to the top of the Greenland ice plateau which towers approximately 3,000 meters (9,843 feet) above sea level. He will then traverse the 2,700-km (1,678-mi.) length of Greenland, at times using ice sailing techniques to relieve the sled dogs of some of their burden. He expects to arrive at Narssarssauq on the southern tip of Greenland by the end of August.

The straight line distance of Uemura's planned journey is 4,300 km (2,672 mi.). His actual surface distance is expected to be more like 6,000 km (3,728 mi.) due to the many lateral trips around ice pressure ridges and stretches of open water encountered during the trek.

The Japanese explorer made his decision to attempt the polar expedition only after he observed the Arctic Ocean ice and Greenland's inland ice sheet twice by air. As part of this preparatory effort, he flew over the area where he expects to mount the Greenland plateau.

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While enroute to the North Pole and then to Greenland, Uemura will maintain radio contact with his base camp near Cape Columbia. By the time he reaches Greenland, his communications center will be shifted to Dundas on Greenland's west coast near Thule. Another communications camp is planned for operations at Sondre Stromfjord, south of Thule on the west coast.

Supplies for the explorer will be replenished by air-drops or landing rendezvous as needed during the journey.

NASA's role in the expedition is limited to providing tracking and data relay services to the Smithsonian. As a special feature, however, the beacon unit on Uemura's dog sled is equipped with a special switch to indicate emergency as a back-up to his voice communications system.

Costs of the venture to NASA are minimal. Both the Nimbus-6 and its ground control computer routinely operate on a 24-hour basis. They acquire data from some 130 buoys, icebergs and other platforms deployed around the world for environmental research.

-more-

The satellite beacon unit was acquired at no cost to NASA by Uemura's backers -- The Mainichi Newspapers and the Bungei Shunju Publishing Co., both of Tokyo, Japan. This unit and its batteries were cold-tested at temperatures of minus 50 degrees Celsius.

The batteries used with the satellite beacon are Lithium Thionyl Chloride packs, developed by the Communications Systems Division of GTE Sylvania, Inc., a subsidiary of General Telephone and Electronics Corp., Needham, Mass.

Drawings to illustrate this news release will be distributed without charge only to media representatives in the United States. They may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
Washington, D.C. 20546

Telephone No: 202/755-8366 Photo Nos: 78-H-98
78-H-99

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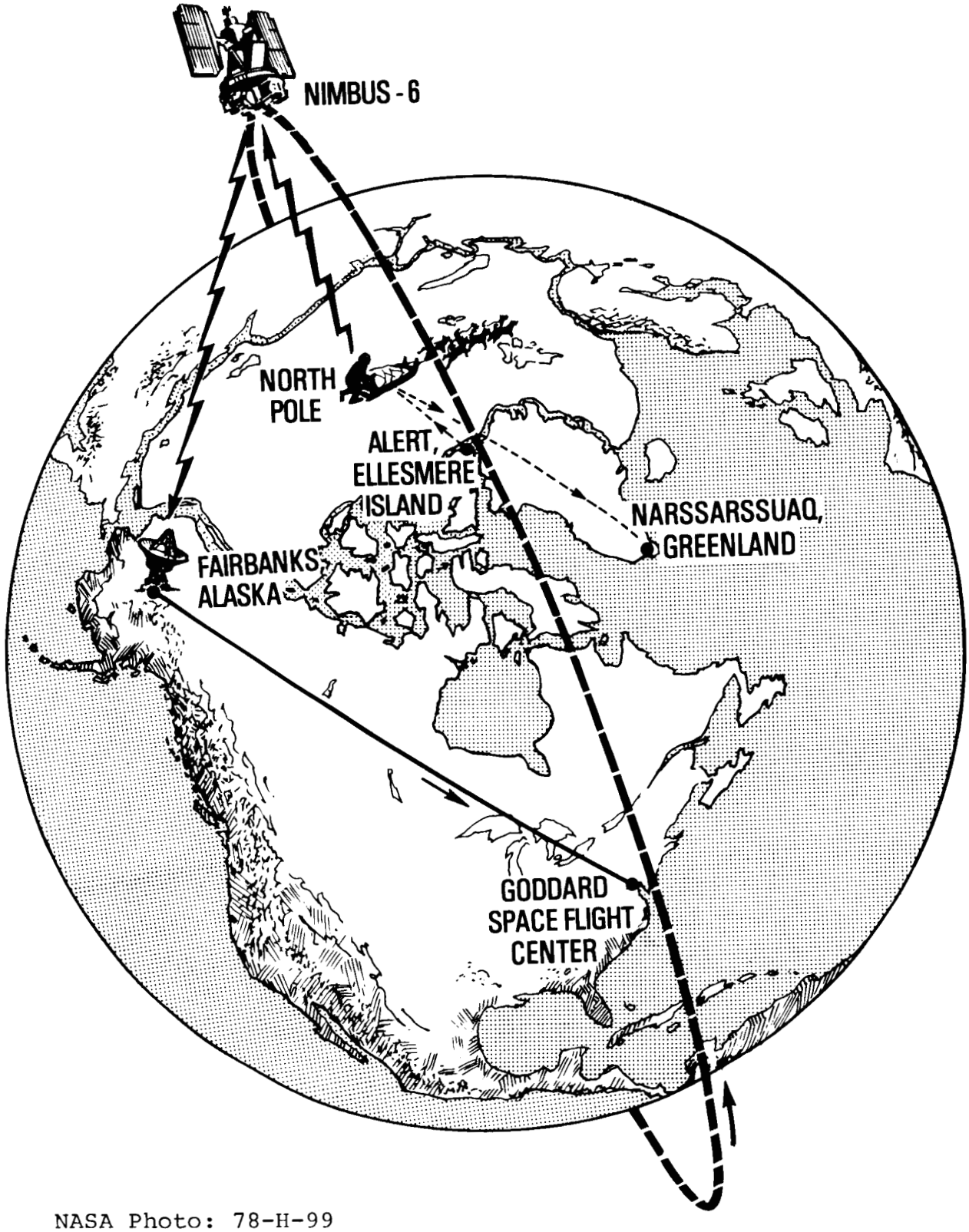
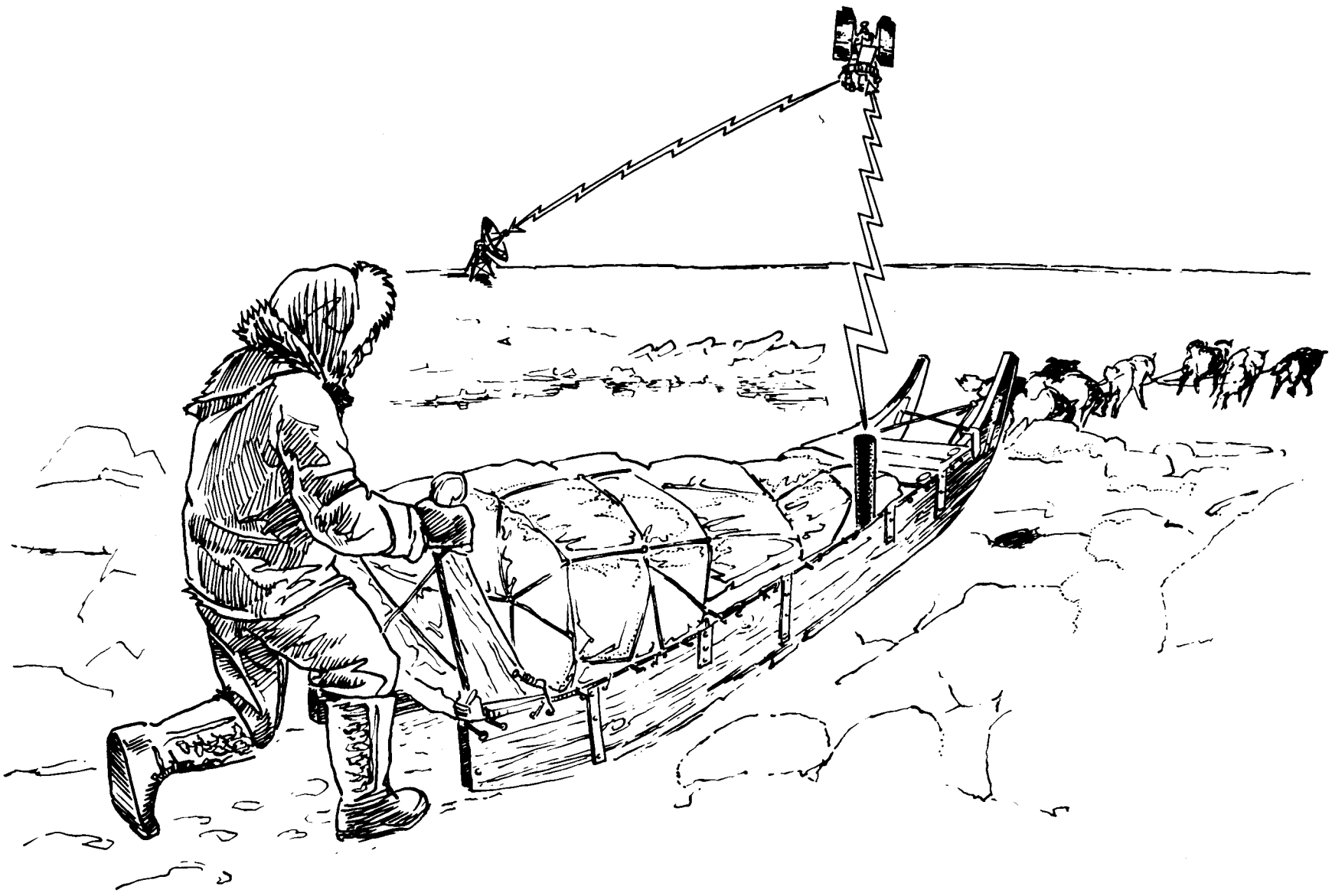


NASA Photo: 78-H-99



NASA Photo: 78-H-98

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IMMEDIATE

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RELEASE NO: 78-31

PACIFIC NORTHWEST GOVERNORS APPROVE NASA SATELLITE APPLICATIONS

Governors Dixy Lee Ray of Washington, John Evans of Idaho and Robert Straub of Oregon have unanimously agreed to a three-year program to demonstrate the use of NASA-supplied satellite data for natural resource management in their states.

The three governors who, with federal representative Pat Vaughan, make up the Pacific Northwest Regional Comission, voted $480,000 from Commission funds to support first-year activities beginning next month.

-more-

Mailed:
March 1, 1978

The three-year plan is designed as a follow-on to the Land Resource Inventory Demonstration Project launched by the Commission in 1975. Under that demonstration project, over 45 state and local agencies in the three states conducted test projects incorporating the satellite data into their surveys and inventories of various land cover types. The program's continuation will provide planning and natural resource management agencies in the three states with an operational capacity to extract and use information derived from NASA's Landsat satellite system and will aid them in handling the more sophisticated data to be gained from Landsat C after its launch in early March.

The Pacific Northwest program joins other demonstration projects across the country in a continuing effort by NASA's Office of Space and Terrestrial Applications to make space technology accessible to state and local governments, businesses and universities.

Technical assistance and training of agency personnel in the demonstration project were supplied by NASA's Ames Research Center, Mountain View, Calif., and the U.S. Geological Survey (USGS) who will continue as partners in the follow-on phase. A seven-member task force, representing state agencies, NASA and USGS, will oversee the demonstration project through 1981.

-more-

State and local agencies in the northwest say that the satellite data has proved valuable in surveying agriculture, forestry, water resources, range lands, urban areas and noxious weeds. Monitoring of two other areas recently affected by federal legislation, surface mining and coastal zone management, will increase in the new three-year effort.

The Pacific Northwest Regional Commission is one of seven multi-state organizations created and funded under Title V of the Public Works and Economic Development Act of 1965. Chartered to promote economic development and stability in the northwest region, the Commission is chaired by Gov. Dixy Lee Ray and co-chaired by federal representative Pat Vaughan.

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NASA News

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IMMEDIATE

RELEASE NO: 78-32

NASA PUBLISHES BOOK ON SEARCH FOR EXTRATERRESTRIAL INTELLINGENCE

A 276-page summary of the findings of a blue-ribbon group of 16 U.S. scientists on ways to detect possible radio signals from intelligent life in the universe, called "The Search for Extraterrestrial Intelligence" (NASA SP-419), has been published by NASA's Scientific and Technical Information Office.

Edited by Professor Philip Morrison of the Massachusetts Institute of Technology and Drs. John Billingham and John Wolfe of NASA's Ames Research Center, Mountain View, Calif., the volume is based on the results of a series of SETI (an acronym for Search for Extraterrestrial Intelligence) workshops held during 1975 and 1976 on the West Coast.

-more-

Mailed:
March 1, 1978

It consists of three major sections: Consensus, Colloquies and Complementary Documents, and contains eight illustrations and numerous tables and figures. The book's Foreword is written by Dr. Theodore M. Hesburgh, C.S.C., President of the University of Notre Dame.

Much of the book is devoted to such complex subjects as preferred frequency bands, search strategies and scanning devices used on radio telescopes. The less technical "Consensus" section at the beginning of the book reviews in general terms the conclusions reached by the SETI group. These are:

- It is both timely and feasible to begin a serious search for extraterrestrial intelligence;
- A significant SETI program with substantial potential secondary benefits can be undertaken with only modest resources;
- Large systems of great capability can be built if needed;
- SETI is intrinsincally an international endeavor in which the United States can take a lead.

-more-

It should be noted that the proposed NASA budget for Fiscal Year 1979 contains a request for $2 million for the start of a SETI program by NASA's Jet Propulsion Laboratory, Pasadena, Calif.

The funds, if approved, are for an all-sky, all-frequency search for radio signals from intelligent extraterrestrial life, using existing antennas of the Deep Space Network at Goldstone, Calif., and some state-of-the-art hardware including a new very-wide-bandwidth supercooled preamplifier that will be developed specifically for the effort. The search would start in October 1978 and last for five years.

In their introduction to the book, the authors describe the SETI effort by saying:

> "This is an exploration of a new kind, an exploration we think both as uncertain and as full of meaning as any that human beings have ever undertaken.
>
> "The search would be an expression of man's natural exploratory drive. The time is at hand when we can begin it in earnest. How far and hard we will need to look before we find a signal, or before we become at last convinced that our nature is rare in the Universe, we cannot now know."

Copies of "The Search for Extraterrestrial Intelligence" can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The stock number is 033-000-00696-0. The price is $4.50.

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NASA News

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For Release:
IMMEDIATE

RELEASE NO: 78-33

UNITED STATES TO LAUNCH JAPAN BSE EXPERIMENTAL COMMUNICATIONS SATELLITE

An experimental Japanese communications satellite, capable of sending television programs directly into an individual's home, will be launched by NASA for Japan from Cape Canaveral, Fla., no earlier than March 23, 1978.

The launch window, which would change a few minutes each day after March 23, is from 4:55 p.m. to 5:12 p.m. EST.

The experimental direct broadcast satellite, technically named Medium-Scale Broadcasting Satellite for Experimental Purposes (BSE), is a space project of Japan's National Space Development Agency (NASDA).

- more -

Mailed:
March 6, 1978

Under an agreement between the United States and Japanese governments, BSE will be launched by NASA's Delta rocket. NASDA will reimburse NASA for the cost of the Delta launch vehicle, launch services and other administrative costs.

NASA's worldwide Spaceflight Tracking and Data Network (STDN) will track the spacecraft for the first few orbits until BSE is sent into its final orbit. NASDA will assume all tracking responsibility after final orbit is achieved.

This experimental Japanese TV spacecraft will test new methods of transmitting high quality color television economically to the Japanese islands and Okinawa. Antenna size for residences and other domestic users will be as small as 1 to 1.6 meters (3.3 to 5.2 feet) with production costs expected to be as low as $200.00 per unit.

Although covering 97 per cent of the main islands, the present Japanese TV network is not economical in remote island and mountain regions. Furthermore, in larger cities, TV reception is often degraded due to reflections of tall buildings.

Because of its high power, BSE will transmit directly to individual low cost, home TV sets even in bad (heavy rain) weather. If successful, this will be of special importance to Japanese who live on the many offshore islands and inaccessible mountain areas where extension of the current domestic TV service is not economical.

Two previous U.S. spacecraft have experimented in relaying high quality, high power television signals to small, low cost ground receivers. They are NASA's Applications Technology Satellite 6 (ATS-6), launched in 1974, and the joint U.S.-Canada Communications Technology Satellite (CTS), launched in 1976. BSE's effective transmitting power will be very similar to ATS-6 and CTS.

The 677.7-kilogram (1494-pound) box-shaped, three-axis stabilized spacecraft will be injected into a transfer orbit of 167 km (104 mi.) by 35,806 km (22,252 mi.), inclined 27.20 degrees to the equator. On third apogee (26.6 hours after launch) a motor attached to the spacecraft will be fired by a NASDA tracking and control station in Japan to place the satellite into its final 35,806 km (22,252 mi.) synchronous orbit, over the equator at about 138 degrees E. longitude. It will then drift to its final position of 110 degrees E. longitude, over Borneo.

The Delta project is managed for NASA's Office of Space Transportation Systems by Goddard Space Flight Center, Greenbelt, Md. Kennedy Space Center, Fla,, is responsible for launch operations. Prime contractor for Delta is McDonnell Douglas Astronautics Corp., Huntington Beach, Calif.

The BSE was built by General Electric Co., Valley Forge, Pa., under contract to Tokyo Shibaura Electric Co., for NASDA. Also sponsoring or participating in the program are the Japanese Broadcasting Corp. (NHK), the Japanese Ministry of Post and Telecommunications (MPOT) and the Radio Research Laboratories (RRL) of Japan.

(END OF GENERAL RELEASE; DELTA LAUNCH VEHICLE INFORMATION FOLLOWS)

DELTA LAUNCH VEHICLE (2914) STATISTICS

The BSE spacecraft will be launched by a three-stage Delta 2914 launch vehicle. This launching will mark the 140th for the Delta rocket which has achieved an impressive performance record of more than 90 per cent. The launch vehicle has the following general characteristics:

Height: 35 ~~37~~.3 m (116 ~~120~~ ft.) including shroud
Maximum Diameter: 2.4 m (8 ft.) without attached solids
Liftoff Weight: 131,895 kg (293,100 lbs.)
Liftoff Thrust: 1,765,315 newtons (396,700 lb.) including strap-on solids.

First Stage

(Liquid Only) consists of an extended long-tank Thor, produced by McDonnell Douglas. The RS-27 engines are produced by the Rocketdyne Division of Rockwell International. This stage has the following characteristics:

Height: 21.3 m (70 ft.)
Diameter: 2.4 m (8 ft.)
Propellants: RJ-1 kerosene as the fuel and liquid oxygen (LOX) as the oxidizer
Thrust: 912,000 N (205,000 lb.)

Strap-on solids consist of 9 TMX-354-5 Castor II solid-propellant rockets produced by the Thiokol Chemical Corp., with the following features:

Height: 7 m (23.5 ft.)
Diameter: 0.8 m (31 in.)
Propellants: Solid
Thrust: 2,083,000 N (468,000 lb.) for nine and 231,400 N (52,000 lb.) for each

Second Stage

Produced by McDonnell Douglas Astronautics Co., using a TRW TR-201 rocket engine; major contractors for the vehicle inertial guidance system located on the second stage are Hamilton Standard, Teledyne and Delco. The second stage has the following characteristics:

Height: 6.4 m (21 ft.)
Diameter: 1.5 m (5 ft.)
Propellants: Liquid, consisting of Aerozene 50 for the fuel and Nitrogen Tetroxide (N_2O_4)
Thrust: About 42,943 N (9,650 lb.)

Third Stage

A TE-364-4 motor produced by Thiokol Chemical Co., with the following characteristics:

Height: 1.4 m (4.5 ft.)
Diameter: 1 m (3 ft.)
Propellants: Solid
Thrust: 61,855 N (13,900 lb.)

MAJOR LAUNCH EVENTS FOR DELTA/BSE MISSION

Event	Time	Altitude Miles/Kilometers		Velocity Mph	Km/Hr
Liftoff	0 sec.	0	0	915	1472
Six Solid Motor Burnout	38 sec.	3.8	6.1	1525	2454
Three Solid Motor Ignition	39 sec.	3.8	6.1	1525	2454
Three Solid Motor Burnout	1 min. 17 sec.	13.4	21.5	2620	4217
Nine Solid Motor Jettison	1 min. 27 sec.	16	26	2828	4550
Main Engine Cutoff (MECO)	3 min. 45 sec.	57	91	12053	19397
First/Second Stage Separation	3 min. 53 sec.	60	97	12072	19427
Second Stage Ignition	3 min. 59 sec.	62	100	12059	19406
Fairing Jettison	4 min. 29 sec.	73	118	12374	19913
First Cutoff Stage II (SECO-1)	8 min. 53 sec.	104	167	17480	28132
Restart Stage II	21 min. 14 sec.	103	166	17479	28130
Final Cutoff-Stage II (SECO-2)	21 min. 24 sec.	103	166	17761	28584
Third Stage Spinup	22 min. 24 sec	103	166	17761	28584
Second/Third Stage Separation	22 min. 26 sec.	103	166	17957	28892
Third Stage Ignition	23 min. 7 sec.	103	166	17759	28581
Third Stage Burnout	23 min. 51 sec.	105	169	22971	36968
Spacecraft Separation	24 min. 54 sec.	121	195	22919	36885

- more -

DELTA BSE TEAM

NASDA

Akyoshi Matsuura	President
Dr. Yashiro Kuroda	Special Assistant to the President
Masayoshi Nojima	Executive Director
Akira Kubozono	System Planning Department
Yoshitaha Kurihara	Applications Satellite Design Group
Yoh Ichikawa	BSE Project Manager
Eiichi Sawabe	Manager, NASDA Philadelphia Office

NASA Headquarters

John F. Yardley	Associate Administrator for Space Transportation Systems
Joseph B. Mahon	Director for Expendable Launch Vehicle Programs
Peter T. Eaton	Manager, Delta Program

Goddard Space Flight Center

Dr. Robert S. Cooper	Director
Robert E. Smylie	Deputy Director
Robert Lindley	Director of Projects
Robert Baumann	Assistant Director for Space Transportation Systems
David Grimes	Delta Project Manager
William R. Russell	Deputy Delta Project Manager, Technical

Robert Goss	Chief, Mission Analysis and Integration Branch, Delta Project Office -- NASA Manager for GMS
E. Michael Chewning	Delta Mission Integration Manager
Edward Lowe	Network Support Manager
John Walker	Network Operations Manager

Kennedy Space Center

Lee R. Scherer	Director
Dr. Walter J. Kapryan	Director, Space Vehicles Operations
George F. Page	Director, Expendable Vehicles
Hugh A. Weston, Jr.	Chief, Delta Operations Division
Bert L. Grenville	Complex 17 Operations Manager
Edmund Chaffin	Spacecraft Coordinator

CONTRACTORS

McDonnell Douglas Astronautics Co. Huntington Beach, Calif.	Delta launch vehicle
General Electric Co. Valley Forge, Pa.	Spacecraft
Tokyo Shibaura Electric Co.	Spacecraft

- end -

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IMMEDIATE

David Garrett
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RELEASE NO: 78-34

SHUTTLE ORBITER DUE AT MARSHALL CENTER

Space Shuttle Orbiter 101, the Enterprise, will arrive at the NASA Marshall Space Flight Center, Huntsville, Ala., March 13 for a crucial series of ground vibration tests. Riding atop the same 747 aircraft that carried it aloft for the recent flight tests in California, the orbiter is scheduled to arrive at 11 a.m. EST.

At the Marshall Center, the orbiter, about the size of a DC-9 aircraft, will be joined to other elements of the Space Shuttle -- the external fuel tank and the solid rocket boosters -- for numerous vibration tests in a 400-foot-tall dynamic test stand. The external tank and solid rocket boosters will be brought to the center by water and rail.

- more -

Mailed:
March 3, 1978

The vibration tests will be concluded in November and the Enterprise will return to the Rockwell International facility, Palmdale, Calif. in December.

The orbiter and 747 aircraft are scheduled to depart NASA's Dryden Flight Research Center, Edwards, Calif. at 11 a.m. EST. March 10. That afternoon at 5 p.m. EST., the mated pair will land at Ellington Air Force Base, Houston Tex., near NASA's Johnson Space Center, for a weekend stopover enroute to Huntsville.

- end -

LH-14

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For Release:

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IMMEDIATE

RELEASE NO: 78-34A

NOTE TO EDITORS: CORRECTION

In Release No: 78-34 (Shuttle Orbiter Due at Marshall Center), the time of arrival at Ellington Air Force Base should read 3 p.m. EST.

-end-

Mailed:
March 7, 1978

NASA News

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(Phone: 202/755-0816)

For Release:
IMMEDIATE

RELEASE NO: 78-35

NASA ENGINEERS PLAN TO RESUME CONTACT WITH SKYLAB

NASA will attempt to contact the orbiting Skylab space station beginning Monday, March 6 from a ground station in Bermuda.

NASA engineers will attempt to turn on the Skylab command and telemetry systems and place some of the on-board storage batteries in a circuit so that they will receive "trickle" charges from the Skylab's solar cell panels.

Objective of the exercise is to determine what condition the Skylab and its subsystems are in and more accurately determine its attitude and whether or not it is tumbling.

-more-

Mailed:
March 3, 1978

The attempt will be conducted by NASA engineers and flight controllers from the Marshall Space Flight Center, Huntsville, Ala., and Johnson Space Center, Houston, Texas, in addition to NASA's Goddard Space Flight Center, Greenbelt, Md., tracking crews.

NASA plans subsequent contacts after mid-April from the Mission Control Center in Houston, through the Bermuda and Madrid ground stations. These contacts would be designed to activate the Skylab attitude reference and control system in order to determine the space station's attitude and possibly modify it.

One of the possibilities is to change the orientation of Skylab in a manner which will reduce atmospheric drag and possibly add some months to its orbital lifetime.

Current NASA predictions indicate that Skylab will enter the atmosphere sometime between early summer 1979 and the second quarter of 1980. NASA is hopeful it will be able to rendezvous with Skylab on a Space Shuttle test flight in October 1979, to remotely maneuver a propulsion stage to dock with Skylab and use this stage to either propel Skylab to a higher orbit for future use or to cause it to reenter the atmosphere in a controlled manner to insure that debris would land in a remote area of an ocean.

The first attempt to communicate with Skylab will be when it is over Bermuda and in the sunlight.

Flight controllers plan to turn on the Skylab Airlock Module-Orbital Workshop telemetry link, evaluate it and turn it off on the first pass.

On a subsequent pass they will repeat the above procedure and also turn on the Apollo Telescope Mount telemetry link and evaluate it, then turn it off.

When the controllers have determined that the communications systems are in order, the next step will be to activate batteries in the Airlock Module and Orbital Workshop and put them on trickle charge from electrical power supplied by the solar panels. The status of the battery charging will be evaluated on later passes of Skylab over Bermuda.

Skylab was launched May 14, 1973 from Florida and was visited by three astronaut crews during 1973-74. The final crew departed February 8, 1974.

-end-

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:
IMMEDIATE

Mary Fitzpatrick
Headquarters, Washington, D.C.
(Phone: 202/755-8370)

RELEASE NO: 78-36

TERRELL NAMED NASA'S DIRECTOR OF INTERNATIONAL AFFAIRS

Norman Terrell has been appointed NASA Director of International Affairs, effective March 1, 1978, and will be responsible for the management and coordination of NASA's international relations and activities.

Terrell joined NASA in August 1977 as Chief of the International Program Policy Office where his responsibilities included U.S./Soviet space relations and United Nations space affairs.

Terrell came to NASA from the Nuclear Regulatory Commission where he was Assistant Director for Policy Review.

- more -

Mailed:
March 6, 1978

From 1963 to 1975, Terrell served as a Foreign Service Officer with the State Department. His positions included Special Assistant to the Counselor and Deputy Director of the Office of International Security Policy and he also served in U.S. Embassies in Canberra and Warsaw. He was awarded the Department of State's Superior Honor Award in 1975 for his work on the Threshold Test Ban Treaty.

A native of Fort Worth, Terrell served with the U.S. Air Force during the Korean War. He received a B.A. degree in Russian Area studies in 1958 from the University of Washington and his M.A. in 1961 from Oxford University, which he attended as a Rhodes Scholar.

He and his wife make their home in Bethesda, Md., with their three children.

- end -

NASA News

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Mary Fitzpatrick
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(Phone: 202/755-8370)

For Release:

IMMEDIATE

RELEASE NO: 78-37

FRUTKIN NAMED DEPUTY ASSOCIATE ADMINISTRATOR FOR EXTERNAL RELATIONS

Arnold W. Frutkin has been appointed NASA Deputy Associate Administrator for External Relations, effective March 1, 1978.

Frutkin has headed NASA's Office of International Affairs for the past 18 years. In his new position, he will support the Associate Administrator for External Relations in the development of external policy and the coordination of NASA activities dealing with its various outside interests.

Before joining NASA, Frutkin was Deputy Director of the U.S. National Committee for the International Geophysical Year.

- more -

Mailed:
March 6, 1978

A graduate of Harvard College, Frutkin did graduate work at Columbia University and served in the U.S. Navy in the Pacific during World War II. He is a Commander USNR (ret.).

During his NASA career, Frutkin was also Adjunct-Professor at the University of Miami's Center for Advanced International Studies, 1969-1970; visiting lecturer and guest fellow at Yale University's Berkeley College, 1974-1975; and is the author of a book, "International Cooperation in Space," 1965 and numerous articles.

He received the NASA Distinguished Service Medal, the NASA Exceptional Service Medal, the National Civil Service League Award and a number of awards from foreign governments.

He and his wife make their home in Potomac, Md.

- end -

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

IMMEDIATE

David Garrett
Headquarters, Washington, D.C.
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Christine Duncan
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/453-0035)

RELEASE NO: 78-38

NASA STUDIES POSSIBILITIES FOR SKYLAB RE-USE

In the event NASA decides to reboost the orbiting Skylab space station to a higher altitude, this could provide an opportunity to reactivate and use the on-board systems and instruments in a variety of useful projects.

The large living quarters and crew accommodations aboard the Skylab would be a welcome adjunct to Space Shuttle and Spacelab missions involving extensive mission equipment and long mission durations. In addition, useful additional experiments might be conducted with Skylab instruments, in some cases in conjunction with complementary instruments planned for flight on Spacelab.

-more-

Mailed:
March 8, 1978

There is also the possibility for new experiments, missions or demonstrations made possible with the Orbiter and Spacelab docked with Skylab. This might include assembly and support of large space structures for communications, solar energy or other public service operations.

NASA's Marshall Space Flight Center, Huntsville, Ala., has awarded parallel study contracts, each in the amount of $125,000, to Martin Marietta Corp., Denver, Colo., and McDonnell Douglas Astronautics Co., Huntington Beach, Calif. The two firms will conduct simultaneous but independent studies of the possibilities and benefits of Skylab re-use.

The nine-month studies will concentrate on missions, experiments and demonstrations that could most effectively use the Skylab facilities, and identification of benefits that could be derived from its use. Some of the areas to be examined are:

- Potential for using experiments or equipment already on board the Skylab and the opportunity to determine first-hand the effects on materials and equipment of 10 or more years' residency in space.

• Possibility of providing crew quarters and other support provisions for Spacelab missions and experiments whose nature would benefit from long duration and an additional energy supply.

• Opportunities that the Skylab in itself or in conjunction with other hardware elements might offer for new missions or experiments. For example, the relatively large facility (comparable to a three-bedroom home) might provide a convenient work platform for fabrication and construction of large space structures or facilitate applying these structures into useful demonstrations or operational systems.

-end-

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

MONDAY,
March 13, 1978

Nicholas Panagakos
Headquarters, Washington, D.C.
(Phone: 202/755-3680)

Kenn Morris
Headquarters, Washington, D.C.
(Phone: 202/755-3897)

RELEASE NO: 78-39

EXPERIMENTS CHOSEN FOR SOLAR POLAR MISSION

Thirty scientific experiments have been tentatively selected by NASA and the European Space Agency (ESA) for the proposed Solar Polar Mission.

The two-spacecraft mission, planned for launch in 1983, is designed to observe the Sun for the first time from the unique perspective of its polar regions.

In doing this, the Solar Polar Mission will explore one of the remaining frontiers of the solar system, namely the third dimension of space away from the plane of the orbits of of the planets.

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Mailed:
March 8, 1978

All previous interplanetary space probes have flown in the orbits of the planets, which essentially intersect the Sun's equatorial regions.

NASA emphasized that the project has not yet been approved by Congress, but said that early selection of scientific participants and investigations allows for a prompt start when approval is received.

NASA and ESA are providing one spacecraft each, and the combined scientific payload is divided between U.S. and European investigators.

Both spacecraft will be launched simultaneously by the Space Shuttle and then directed on a trajectory in the ecliptic plane (the plane which contains all of the planets) to Jupiter by an Inertial Upper Stage booster.

The two spacecraft will swing around Jupiter and use the gravity of that giant planet to redirect their paths out of the ecliptic plane back toward the Sun in trajectories -- one northbound and one southbound -- that are essentially mirror images of each other.

They will pass over the north and south solar poles, swing through perihelion (the distance closest to the Sun) in the ecliptic plane, pass respectively over the other solar poles and then fly back out to the vicinity of Jupiter's orbit.

The period from launch until shortly after the second pair of polar passages is approximately five years.

The investigations are expected to return important new knowledge on the solar wind, cosmic rays and the three-dimensional structure and evolution of the Sun's corona (the outermost solar atmosphere). This information, in turn, will contribute to an understanding of the solar phenomena that shape and control our own planet's space environment.

Scientists now know that the high energy streams which are in the solar wind originate mainly in solar polar regions. In some way, these find their way to Earth, which is in the plane passing through the Sun's equator. These energetic streams may play an important role in weather changes. The Solar Polar Mission will shed light on this important question. The sources of these streams, the solar "coronal holes," exist primarily in solar polar regions, even during those times in the solar cycle when there is little solar activity.

-more-

The advantages of a dual spacecraft mission are significant. Sending spacecraft simultaneously over each of the opposite solar poles allows comparisons of the various solar and interplanetary phenomena that are affected by the differences in solar activity that typically occur between the northern and southern solar hemispheres. This duality of spacecraft greatly enhances the ability to understand how various solar activities affect the velocity, composition, density and magnetic field structure of the solar wind flow that impinges on the Earth's magnetosphere.

According to current plans, the northbound polar craft will spend about 110 days observing above a solar latitude of 60 degrees before swinging down over the southern half of the Sun. The southbound polar craft will move in an orbit that is a near-mirror image about the ecliptic plane of its companion.

In anticipation of a fiscal 1979 Congressional authorization of the mission, NASA's Jet Propulsion Laboratory, Pasadena, Calif., who will manage the mission for NASA, is supporting studies of the U.S. spacecraft, payload and mission design concepts.

More than 150 American and European scientists will participate in the Solar Polar investigations.

Titles of the 30 experiments tentatively selected and the Principal Investigators or Co-Principal Investigators of each are as follows:

M. H. Acuna NASA Goddard Space Flight Center	Magnetic Field Experiment
George Gloeckler University of Maryland John Geiss University of Bern, Switzerland	Solar Wind Ion Composition Spectrometer and Studies
E.C. Stone California Institute of Technology	Comprehensive Particle Analysis System
T.L. Cline Goddard Space Flight Center	Solar X-ray Flare and Cosmic Gamma Ray Burst Experiment
S.J. Bame Los Alamos Scientific Laboratory, N.M.	Plasma Spectrometer Experiment
R.M. Macqueen High Altitude Observatory Boulder, Colo.	White Light Coronograph/X-ray XUV Telescope Experiment
J.A. Simpson University of Chicago	Cosmic Ray and Solar Particle Investigation
L.J. Lanzerotti Bell Laboratories, Murray Hill, N.J.	Heliosphere Instrument for Spectrum, Composition and Anisotropy at Low Energies (Partial Selection)
R.G. Stone Goddard Space Flight Center	Plasma Waves and Radio Observations
J.L. Weinberg State University of New York at Albany	Photopolarimetry and Imaging During the Mission: Interplanetary, Astronomical and Planetary (Partial Selection in Collaboration with Giese)
E.J. Smith NASA Jet Propulsion Laboratory	Magnetic Field Investigation

K.C. Hurley Centre d'Etude Spatial des Rayonnements -- Toulouse, France; and Michael Sommer Max Planck Institute, Garching, Germany	Measurement of Solar X-radiation, Cosmic Gamma Ray Burst and Jovian X-rays
Horst Kunow University of Kiel, Germany	Dual Janus Bidirectional Solid State Telescope for Solar and Galactic Cosmic Rays
P.C. Hedgecock Imperial College, London	Interplanetary Magnetic Field Measurements in the Heliosphere
R.H. Giese Ruhr-Universitat Bochum, Germany	Out-of-Ecliptic Zodiacal Light Experiment (In Collaboration with Weinberg)
Eberhard Grun Max Planck Institute Fur Kernphysik Heidelberg, Germany	Out-of-Ecliptic Cosmic Dust Experiment
Helmut Rosenbauer Max Planck Institute Lindau, Germany	Direct Measurement of the Fluid Parameters of the Nearby Interstellar Gas Using Helium as a Tracer
Helmut Rosenbauer Max Planck Institute	Mass Separating Solar Wind Experiment
C. P. Sonett University of Arizona	Interdisciplinary and Theoretical Investigations
J.R. Jokipii University of Arizona	Cosmic Rays and Their Interaction in the Heliosphere and Galaxy
J.C. Brandt Goddard Space Flight Center	Calibration of Ground Based Cometary and Interplanetary Scintillation Solar Wind Measurements with In-Situ Spacecraft Data
L. Fisk University of New Hampshire W.I. Axford Max Planck Institute Lindau, Germany	A Theoretical Team to Support the Out-of-Ecliptic Mission

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Aaron Barnes NASA Ames Research Center	Theoretical Studies of the Dynamics of the Solar Wind
Giancario Noci Arcetri Observatory, Italy	Dependence of Mass Flow and Ion Composition of the Solar Wind on Heliographic Latitude
Joseph Lemaire Institute D'Aeronomie Spatiale de Belgique, Brussels	Interdisciplinary Study of Discontinuities and Current Sheets in the Solar Wind
P.S. Callahan Jet Propulsion Laboratory	An Investigation of Changes in the Electron Columnar Content Using Dual Frequency Radio Metric Tracking
P.B. Esposito Jet Propulsion Laboratory	Radio Science Investigation
Hans Holland University of Bonn, Germany	X/X-Band Faraday Rotation and Dispersion Measurements During Solar Occultation of the Spacecraft
H.D. Wahlquist Jet Propulsion Laboratory	Experiment Gravity: (1) Gravitational Radiation, and (2) Celestial Mechanics
Bruno Bertotti University of Pavia, Italy	Detection of Gravitational Wave Bursts from the Nuclei of Distant Galaxies and Quasars

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A photograph to illustrate this news release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
Washington, D.C. 20546

Telephone No: 202/755-8366 Photo No: 78-H-104

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NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

IMMEDIATE

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RELEASE NO: 78-40

LUNAR AND PLANETARY DISCOVERIES TO BE PRESENTED AT HOUSTON

The Moon and other worlds are the focus of the ninth annual Lunar and Planetary Science Conference, a weeklong meeting to be held at NASA's Johnson Space Center, Houston, beginning Monday, March 13.

The conference, which is expected to attract more than 500 scientists from the United States and abroad, is being hosted jointly by Johnson Center and the Lunar and Planetary Institute of Houston.

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Mailed:
March 8, 1978

The conference will include 471 papers on such varied subjects as the formation of the solar system, new discoveries in Moon rocks, the histories of planets, meteorites that contain material from ancient stars and comparative studies of Mars, Venus and the Earth. A summary session, presented Friday morning, March 17, will describe the major new discoveries in these and other areas of research.

For the third consecutive year, the Soviet Union is sending a delegation of space scientists to participate in the conference.

The conferences, begun in 1970, were originally used to share the knowledge gained from the lunar samples returned by the Apollo missions. The first six Lunar Science Conferences were almost entirely involved with lunar studies. More recently, lunar research has become increasingly important for helping to understand the other planets of the solar system, and the last two conferences, in 1976 and 1977, included much more information about comparative studies of such other worlds as Mercury, Venus, Mars and the asteroids. The name of this year's conference has been changed to "Lunar and Planetary" to reflect the continuing trend for combined studies in planetary exploration.

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This year's conference is separated into seven main topics, with sessions occurring simultaneously throughout the week. The sessions are entitled: Constraints on Structure, Composition and History of Planetary Interiors; Characteristics and Movement of Material on Lunar, Planetary and Asteroidal Surfaces; Characterization and Evolution of Volcanic Landforms; Characterization and Evolution of Planetary Crusts; Nature and Effects of Impact Processes; Extraterrestrial Materials; Solar, Interplanetary, Interstellar Probes; and Earliest History of the Solar System.

Several special sessions have been scheduled to cover especially exciting or interdisciplinary fields of research. Two such sessions will be held Tuesday, March 14, at 1:30 p.m. One, "Industrial Development of Near-Earth Space," will present 10 speakers who will discuss topics relating to future space habitation: the availability of resources in space near the Earth, and the environmental impact of performing mining operations on the Moon or on captured asteroids.

The second session, called "Planetary Interiors: What Do We Really Know?" discusses the parts of planets that we can never observe directly. The session covers such topics as density, gravity fields, magnetic fields, continental motions, chemical compositions and the histories of the moons of different planets.

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Chairman for the space industrialization session is Dr. David Criswell, staff scientist at the LPI. Chairman for the planetary interiors session is Dr. Gary Latham, a geophysicist from the University of Texas Marine Science Institute.

Another special session Tuesday will discuss the origin of the solar system. Entitled "In the Beginning...," the meeting will be held in the main Johnson Center auditorium and will be open to the public. It will feature five science teams presenting their differing views about the earliest events and the subsequent development of the solar system.

While Tuesday's sessions explore the past and the present of the solar system, a special meeting on Wednesday will discuss the future. Entitled "Looking Forward," this session will include a series of papers about future planetary exploration, covering new and promising techniques such as radar mapping of Venus and discussing future missions that could be sent to Mars.

Mars and Mercury will be discussed together at a meeting devoted exclusively to new results on these two planets.

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A special session on meteorites will present new results from a new "gold rush" in space sciences: the discovery of dozens of well-preserved meteorites on the frozen Antarctic ice cap this past winter. Prof. William Cassidy, the University of Pittsburgh geologist who made the discovery along with a science team from Japan, believes that two of the meteorites may be preserved material from a very early period of solar system history.

These two meteorites, along with about 300 other fragments, will be examined in detail at the Johnson Center later this spring and summer. This collection may prove to be an important source of new information about the origin and history of the solar system. Two of the specimens are believed to be carbonaceous chondrites, a rare carbon-bearing type of meteorite that may give us a new understanding about the origin of life.

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NASA
National Aeronautics and
Space Administration

General Aviation Technology Program

Release No: 78-41
April 1978

RELEASE NO: 78-41

CONTENTS

April 1978

NASA GENERAL AVIATION RESEARCH

AND TECHNOLOGY PROGRAM

Objectives of the NASA General Aviation Research and Technology program are:

- To provide new technology for improvements in safety and efficiency
- Reduction of the environmental impact of general aviation aircraft
- To insure that an adequate base of new technology exists to support the continued growth in the utility of the light airplane

Flight Efficiency

In aerodynamics, emphasis has been placed on airfoil development, resulting in significant improvements in performance in all speed ranges.

Most recently a new medium speed airfoil family has been developed for use on small executive and business airplanes powered by turbofans or turbopropellers.

Beginning with the NASA-developed low-speed GA(W)-1 airfoil, (now known as LS(1) -- 0413), and using the design technology developed for high-speed supercritical airfoils, a new airfoil has been derived with improved aerodynamic characteristics at cruise. This airfoil appears to provide excellent performance up to a Mach number slightly higher than 0.7. Wind tunnel tests are underway to verify its low-speed, high-lift characteristics.

To assist the general aviation industry, an airfoil design institute has been established at Ohio State University to provide optimized point-design airfoils for industry customers.

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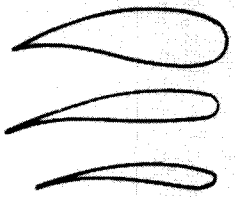
AERODYNAMIC EFFICIENCY

AIRFOILS



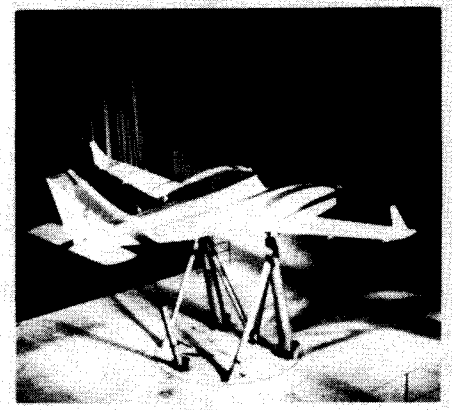
LOW SPEED

MEDIUM SPEED

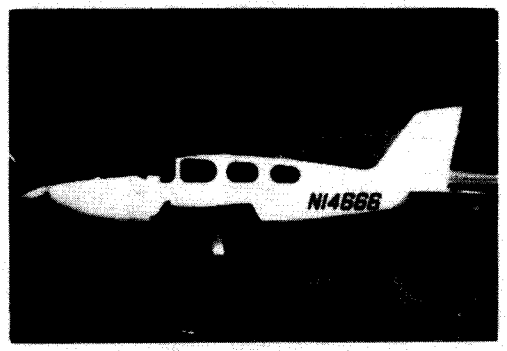
HIGH SPEED

DESIGN INSTITUTE

CONFIGURATIONS



ATLIT



SKY ROCKET

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In addition to the airfoil, many other elements in the design of an aircraft contribute to its aerodynamic efficiency. A number of these factors are being examined as part of the advanced technology light twin (ATLIT) program. The ATLIT has demonstrated the effectiveness of a new technology wing including full-span flaps and spoiler roll control. Means for reducing interference drag between the wing and fuselage have been evaluated in the full-scale wind tunnel. Addition of winglets has the potential for improving climb performance.

Propulsion efficiency is equal in importance to aerodynamics in the overall effort to reduce fuel consumption. Research was completed on a hydrogen enrichment concept using a TIO-542 fuel-injected turbo-supercharged engine. It was found that significant improvements in fuel consumption were achievable by a combination of leaning out the mixture and advancing the spark without hydrogen injection. A 10 to 12 per cent reduction in fuel consumption was obtained relative to the standard factory setting of spark advance and fuel flow. Improvements in carbon monoxide and unburned hydrocarbon emissions were also noted. Results of this work are under active consideration by the engine manufacturers for application to new production engines.

Avionic Research

To be effective as a transportation mode, the airplane must have the capability to interact with the traffic control system as well as provide navigation, guidance, stabilization and systems management functions necessary for safe, reliable operations in adverse weather.

As the aircraft and the air system in which it must operate have become more complex, the cost of providing these functions has grown to very high levels.

NASA has a significant effort underway to reduce the complexity and cost of these functions. The objective is to provide information required for the design of low-cost, advanced avionic systems applicable to general aviation in the 1980s and beyond.

Results of recent studies have been integrated into specifications for final systems design, fabrication and installation on a twin engine general aviation aircraft for flight evaluation in 1979 and 1980.

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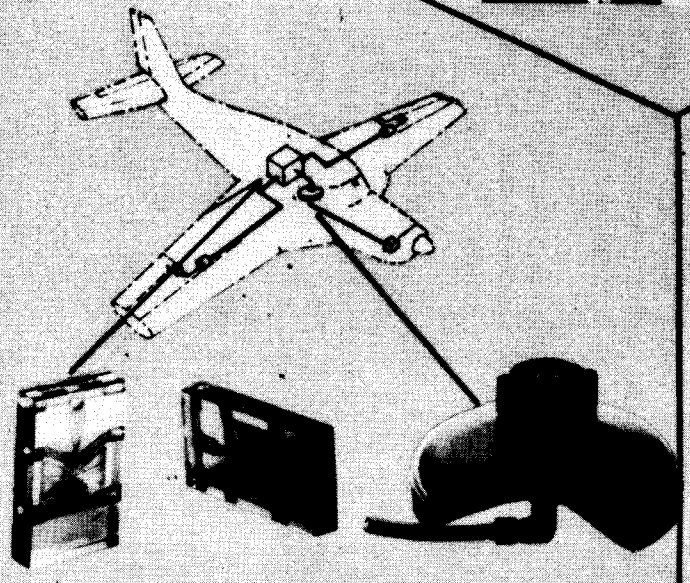
ADVANCED AVIONICS

INTEGRATED SYSTEM ARCHITECTURE

FLIGHT CONTROL | ENGINE SYSTEM | COMPUTER | NAVIGATION | TRAFFIC CONTROL | COMMUNI-CATIONS

LOW COST FLUIDIC WING LEVELER



NEW CAPABILITY SATELLITE NAVIGATION

Supporting the general aviation advanced avionics program, are related activities in electro-fluidics technology, navigation/communications technology and stall onset sensor development. Wind tunnel and flight tests of a fluidic rudder and fluidic wing tips have been documented and a fluidic wing-leveler/turn-coordinator was successfully flight tested in a U-3 test aircraft.

Continued tests of upgraded fluidic control surfaces are planned and a three-axis electro-fluidic autopilot will undergo simulator tests. A "satellite-in-runway" GPS landing guidance concept will be investigated for potential general aviation application. A number of flight IFR aids are currently under consideration.

Agricultural Aircraft

In addition to transportation of people and goods, light aircraft are employed in a wide range of special activities. Of particular interest is use of aircraft in agriculture. NASA is defining key technical problems limiting accuracy and efficiency of the aerial application of agricultural materials.

Initial efforts are emphasizing interactions between the aircraft flow field and the material being applied. A computer program has been developed to permit analysis of the effects of changes to the aircraft on the trajectories of particles released in the aircraft wake. Model testing techniques, including scaled particles, have been developed using a vortex facility.

Safety

Safety is receiving considerable emphasis within the NASA general aviation program. Principal areas of concentration include the automatic pilot advisory system (APAS), structural crashworthiness, stall/spin research and investigation of alternate fuels such as automotive gasoline for aircraft.

Technology is being developed for a low-cost computer-aided system to provide automated airport and traffic advisories. The APAS system would service all aircraft equipped with standard NAV-COM systems. It consists of a conventional radar, meteorological sensors and synthesized voice messages under control of a mini-computer.

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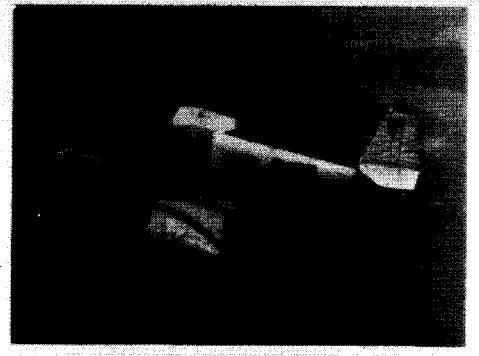
GENERAL AVIATION STALL/SPIN RESEARCH PROGRAM

SPIN TUNNEL

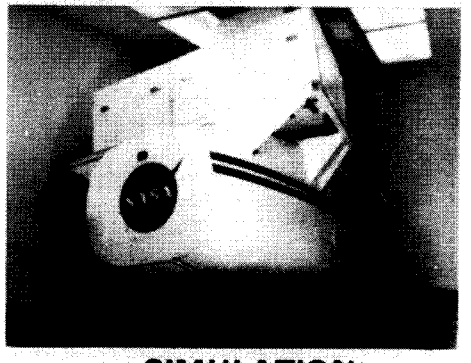
RADIO-CONTROLLED MODELS



FLIGHT TESTS

WIND-TUNNEL MODELS

FULL-SCALE
WIND-TUNNEL TESTS



SIMULATION

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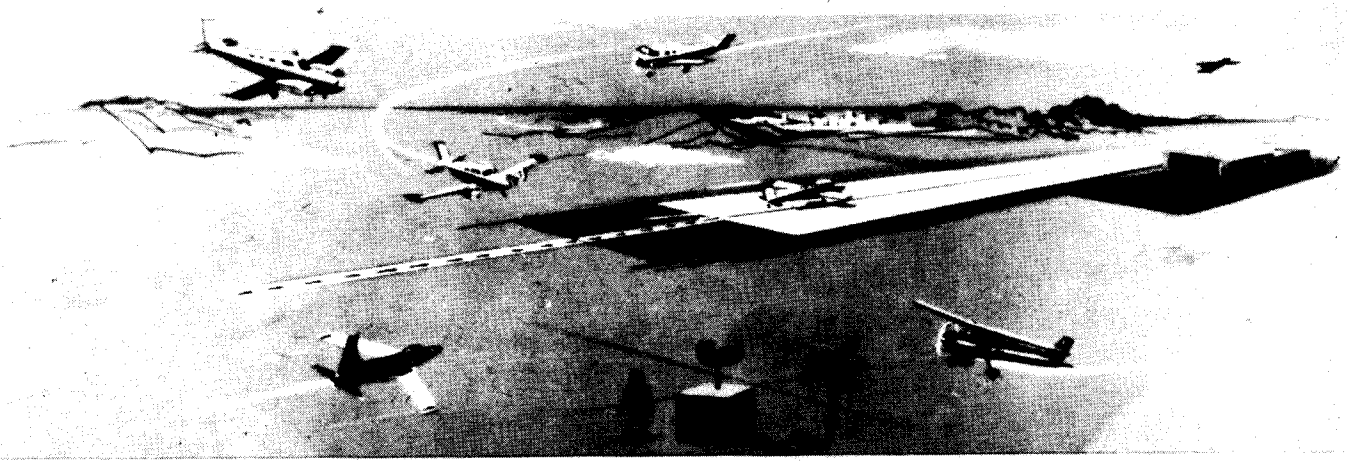
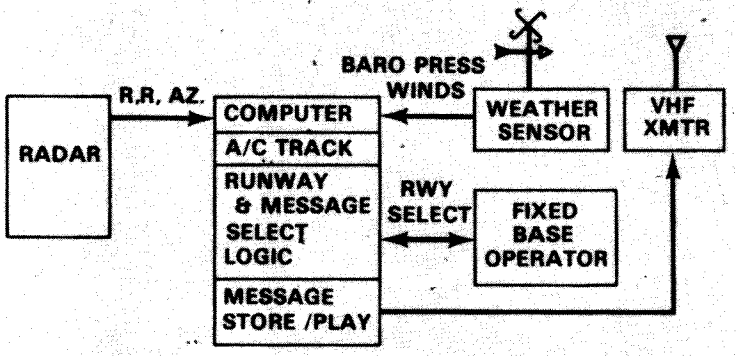
AUTOMATIC PILOT ADVISORY SYSTEM



SYSTEM CONCEPT



COMPUTER GENERATED VOICE BROADCAST

TYPICAL MESSAGE FORMATS

(MESSAGE TIME 16 SEC.)	.....TRAFFIC ADVISORY...HYDE FIELD... ...DEPARTING AIRCRAFT ONE MILE NORTH... ...ARRIVING AIRCRAFT TURNING BASE ...ARRIVING AIRCRAFT TWO MILE WEST ...ARRIVING AIRCRAFT THREE MILES NORTHEAST, HEADING TWO NINER ZERO (HEADING GIVEN WHEN GREATER THAN 30° FROM RADIAL TO /FROM AIRPORT)
(MESSAGE TIME 12 SEC.)	.....AIRPORT ADVISORY...HYDE FIELD... ...ACTIVE RUNWAY TWO...TWO...WIND...THIRTEEN KNOTS FROM TWO ONE ZERO ...ALTIMETER...TWO NINER POINT NINER FOUR
MESSAGE TIME 13 SEC.)	.....COLLISION WARNING...HYDE FIELD... ...AIRCRAFT THREE MILES NORTHEAST HEADING TWO TWO ZERO HAS THREAT THREE O'CLOCK ONE MILE... ...AIRCRAFT TWO MILES NORTH HEADING ONE TWO ZERO HAS THREAT TEN O'CLOCK ONE MILE...

-more-

Airport advisories would be broadcast every two minutes to all planes operating in the vicinity of an airport, disclosing the name of the airfield, the active runway, local weather conditions, the position and direction of departing and arriving aircraft and cautionary and collision avoidance warnings.

Airport advisory systems tests and demonstrations are underway, and the pilot advisory system demonstration is scheduled for August 1978 at NASA's Wallops Flight Center, Wallops Island, Va.

Improved structural crashworthiness is the objective of the joint NASA/FAA program. The program consists of experimental, analytical and design elements, all leading to substantial improvements in occupant crash survivability.

Emphasis is placed on developing a capability for predicting the dynamic response of aircraft structure during impact. This is especially important in designing future aircraft to insure that the space surrounding the occupant maintains sufficient integrity during a crash.

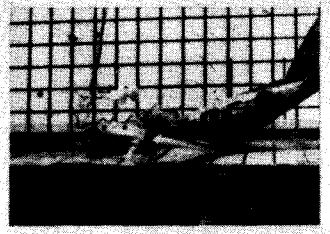
Current finite element structural analysis methods do not accommodate large nonlinear deflections. In conjunction with the FAA, NASA is currently extending a finite element analysis capability into that region.

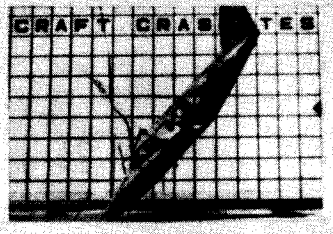
Full-scale crash tests have provided an extensive data base on maintenance of cabin integrity and livable volume for a variety of crash conditions. Together with the finite element analysis, this will provide a basis for designing more crashworthy structures. Concurrent with improved prediction will be introduction of energy-absorbing structural concepts.

A major near-term improvement in crash survivability can be made in general aviation seats and passenger restraints. NASA has developed an analytical simulation which is an extension of an FAA technique for predicting the dynamic behavior of the seat and occupant coupled with a variety of restraining systems. Concurrent with this, selected energy absorbing seat concepts are moving into the design and development phase.

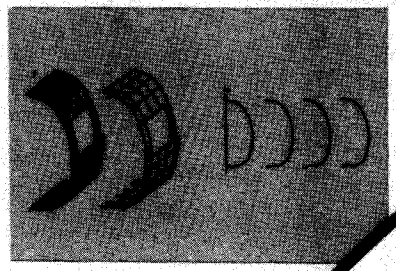
Much controversy has been raised over the various grades of aviation gasoline available for piston engines and possible use of automotove fuel in some less critical areas. While some data and experience exist on the viability of using fuel other than factory specified aviation gasoline, it is not well documented, nor generally accepted.

IMPROVED CRASHWORTHINESS



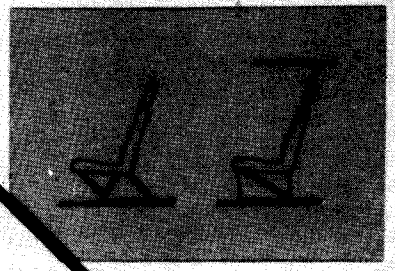


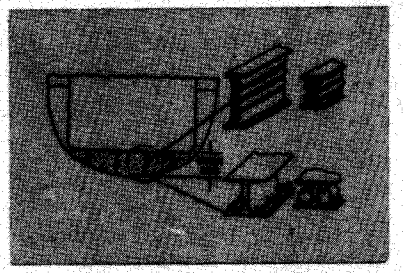
NON LINEAR FINITE ELEMENT ANALYSIS



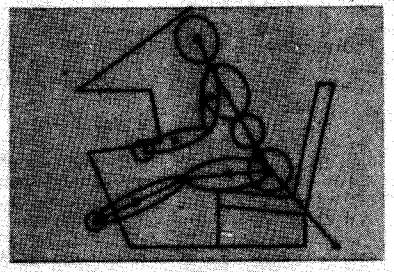
FULL SCALE TESTING

ENERGY ABSORBING, SEATS





ENERGY ABSORBING CONCEPTS



MAN-SEAT SIMULATION

The NASA program will conduct accelerated life cycle tests on several representative piston engines to determine tolerance of the engines to the various fuels. Complete documentation will be maintained on component wear and performance throughout the program.

Environmental Impact

The noise and exhaust emissions generated by light aircraft operations are perceived as major factors effecting the growth and health of small community airports.

Reducing this environmental impact continues to be a high priority objective of NASA's aeronautical program. The noise and pollution programs are intended to provide through basic research the knowledge and understanding necessary to reduce noise and exhaust pollution levels from aircraft engines. This information will assist the industry and the regulatory agencies in meeting future noise goals.

Research is being carried out on propeller noise generation. Flight test data have been generated on the effects of atmospheric turbulence on propeller blade loading and the resulting impact on propeller noise. Since this effect changes between flight and ground operations, it has been one of the limiting factors in the ability to predict flight noise levels from static ground measurements. Future work will evaluate the effects of blade speed and configuration on noise and in combining the aerodynamic and acoustic performance aspects of propellers for overall optimization. A new program jointly sponsored by EPA and NASA has been initiated to evaluate general aviation propellers.

The Quiet, Clean General Aviation Turbofan program has progressed to the detailed design phase. During 1978 and 1979, engine testing will be underway with delivery of the engine to NASA for further test and evaluation.

In the clean combustor program for general aviation, an engine demonstration program has been initiated to verify low emission combustor concepts of the airblast fuel injection and premix/prevaporization type combustors. Bench testing of these concepts shows that significant emissions reduction is possible. This will allow future engines to meet EPA 1979 goals.

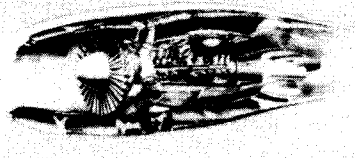
NOISE REDUCTION

PROPELLERS

UNSTEADY BLADE LOADING

TURBINES

AVCO LYCOMING



GARRETT AIRESEARCH

QUIET CLEAN GENERAL AVIATION TURBOFAN (QCGAT)

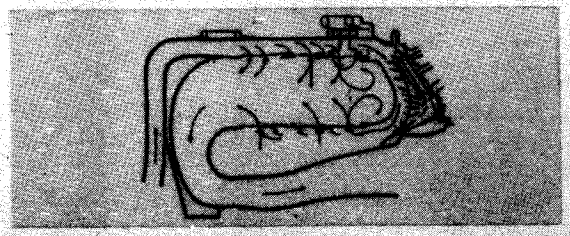
-more-

EMISSION REDUCTION

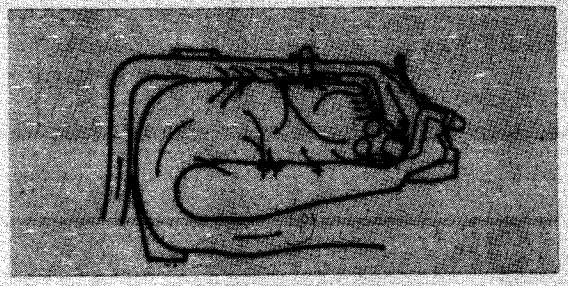
TURBINES (T-1)
EPA REGULATIONS 1 JAN 1979
HC 1.6
CO 9.4 } **LB/1000LB THRUST/LTO**
NOx 3.7

PISTON ENGINES (P-1)
EPA REGULATIONS 31 DEC 1979
HC .0019
CO .042 } **LB/1000HP/LTO**
NOx .0010

CLEAN COMBUSTION

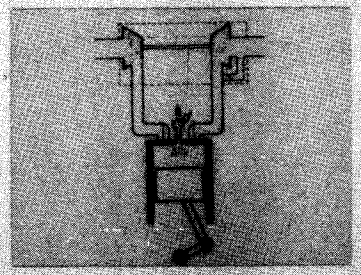


BASELINE



PREVAPORIZATION

ENGINE TESTS



COMBUSTION PROCESSES

-more-

Research is continuing on low emission piston engines. Lean burning was demonstrated on piston engines, resulting in lower emissions levels, as previously described. Advanced high energy ignition systems, fuel injection systems and variable-valve timing promise even further reductions and are being investigated, both in NASA facilities and by contractors.

Summary

General aviation research is receiving strong and growing support within NASA. Problems and concerns of the industry are being addressed in research programs.

Results from several recent programs are being used by industry in designing new aircraft. While many technical problems remain, mechanisms for developing solutions through NASA research exist.

-end-

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release IMMEDIATE

Press Kit

Project INTELSAT IV-A(F6)

RELEASE NO: 78-42

Contents

Mailed:
March 20, 1978

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

IMMEDIATE

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Lewis Research Center, Cleveland, Ohio
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RELEASE NO: 78-42

SIXTH INTELSAT IV-A LAUNCH SCHEDULED

The sixth Intelsat IV-A commercial communications satellite will be launched by NASA aboard an Atlas Centaur rocket from Kennedy Space Center, Fla., no earlier than March 30, 1978.

The satellite, which weighs 1,480 kilograms (3,263 pounds) at launch, is intended for service in the Indian Ocean region.

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Intelsat IV-A(F6) satellite will be placed in geostationary orbit over the Indian Ocean at 63 degrees East longitude, where it will provide international communications services to some 40 countries in the Indian Ocean region.

Intelsat IV-A(F3), launched Jan. 6, 1978, will be placed at 60 degrees E. longitude and serve as a backup to Intelsat IV-A(F6). Each satellite has a seven-year design life and the capacity to relay more than 6,000 simultaneous telephone calls and two television programs.

The Intelsat satellites are owned by the International Telecommunications Satellite Organization (INTELSAT). The Communications Satellite Corp. (COMSAT), the United States member, is also the management services contractor for the satellite system. NASA is reimbursed for all costs of the Atlas Centaur and launch services by COMSAT on behalf of Intelsat, under provisions of a launch services agreement.

The Atlas Centaur AC-48 launch vehicle is expected to place the Intelsat IV-A in a highly elliptical orbit of 548 by 35,788 kilometers (341 by 22,240 miles). After reorientation of the satellite, a solid propellant rocket motor aboard the spacecraft will be fired to circularize the orbit at synchronous altitude 35,788 km (22,240 mi.) over the equator.

At that altitude, because the speed of the spacecraft in orbit matches the rotational speed of the Earth, the satellite remains in position over one spot.

NASA's Lewis Research Center, Cleveland, Ohio, has management responsibility for the Atlas Centaur development and operation. NASA's Kennedy Space Center, Fla., is assigned vehicle checkout and launch responsibility once the vehicle reaches Cape Canaveral.

The Intelsat IV-A satellites, built by Hughes Aircraft Co., El Segundo, Calif., are 6.98 meters tall (about 23 feet) and weigh 1,480 kg (about 3,263 lb.) at liftoff and 825.5 kg (1,820 lb.) after apogee motor firing.

This Intelsat IV-A launch costs approximately $47 million -- $18 million for the satellite and $29 million for the Atlas Centaur launch vehicle and related services.

(END OF GENERAL RELEASE. BACKGROUND INFORMATION FOLLOWS.)

ATLAS CENTAUR LAUNCH VEHICLE

The Atlas Centaur is NASA's standard launch vehicle for intermediate weight payloads. It is used for the launch of Earth orbital, Earth synchronous and interplanetary missions.

Centaur was the nation's first high-energy, liquid-hydrogen/liquid-oxygen propelled rocket. Developed and launched under the direction of NASA's Lewis Research Center, it became operational in 1966 with the launch of Surveyor 1, the first U.S. spacecraft to soft-land on the Moon's surface.

Since that time, both the Atlas booster and Centaur second stage have undergone many improvements. At present, the vehicle combination can place, 4,536 kg (10,000 lb.) in low Earth orbit, 1,882 kg (4,150 lb.) in a synchronous transfer orbit and 907 kg (2,000 lb.) on an interplanetary trajectory.

The Atlas Centaur, standing approximately 40.8 m (134 ft.) high, consists of an Atlas SLV-3D booster and Centaur D-1AR second stage. The Atlas booster develops 1,920 kilonewtons (431,300 lb.) of thrust at liftoff using two 822,920-newton (185,000-lb.) thrust booster engines, one 266,890-N (60,000-lb.) thrust sustainer engine and two vernier engines developing 2,890 N (650 lb.) thrust each. The two RL-10 engines on Centaur produce a total of 133,450 N (30,000 lb.) thrust. Both the Atlas and the Centaur are 3.048 m (10 ft.) in diameter.

Until early 1974, Centaur was used exclusively in combination with the Atlas booster. It was subsequently used with a Titan III booster to launch heavier payloads into Earth orbit and interplanetary trajectories.

The Atlas and the Centaur vehicles have been updated over the years. Thrust of the Atlas engines has been increased about 222,400 N (50,000 lb.) since its debut in the space program in the early 1960s.

The Centaur D1AR has an integrated electronic system that performs a major role in checking itself and other vehicle systems before launch and also maintains control of major events after liftoff. The new Centaur system handles navigation and guidance tasks, controls pressurization and venting, propellant management, telemetry formats and transmission and initiates vehicle events. Most operational needs can be met by changing the computer software.

TYPICAL LAUNCH VEHICLE CHARACTERISTICS

Liftoff weight including spacecraft: 148,060 kg (326,419 lb.)

Liftoff height: 40.8 m (134 ft.)

Launch Complex: 36B

	Atlas Booster	Centaur Stage
Weight (with propellants)	130,317 kg (287,300 lb.)	17,781 kg (39,200 lb.)
Height	21.3 m (70 ft.)	19.5 m (64 ft.) with payload fairing
Thrust	1,919 kn (431,300 lb.) at sea level	133,447 N (30,000 lb.) in vacuum
Propellants	Liquid oxygen and RP-1	Liquid oxygen Liquid hydrogen
Propulsion	MA-5 system two 822,921-N (185,000 lb.) thrust booster engines, one 266,893-N (60,000 lb.) thrust sustainer engine, two 2,891-N (650-lb.) thrust vernier engines.	Two 66,723-N (15,000-lb.) thrust RL-10 engines, 12 hydrogen peroxide thrusters.
Velocity	9,205 km/hr (5,720 mph) at booster engine cutoff (BECO) 13,061 km/hr (8,116 mph) at sustainer engine cutoff (SECO).	33,345 km/hr (20,720 mph) at spacecraft separation.
Guidance	Preprogrammed profile through BECO, switch to inertial guidance for sustainer phase.	Inertial guidance

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LAUNCH OPERATIONS

The Atlas Centaur stages of the Atlas Centaur 48 launch vehicle arrived at Cape Canaveral Air Force Station Jan. 11, 1978, and were erected on Pad B, Complex 36, Jan. 25-26. Following completion of electrical, pneumatic, hydraulic, propulsion and guidance systems checkout and testing, a Terminal Countdown Demonstration Test (TCD) was performed March 8. The TCD demonstrated the integrity of the vehicle-to-ground systems interface in a cryogenic environment which duplicated launch countdown conditions.

The Intelsat IV-A(F6) spacecraft was received Jan. 18 and underwent systems checkout in Hangar AM. The spacecraft was moved to the Spacecraft Assembly and Encapsulation Facility March 14, where hydrazine loading and encapsulation of the payload fairing were completed.

The spacecraft/payload fairing assembly is scheduled for mating with the launch vehicle March 22 in support of the Combined Readiness Test March 23. Final countdown preparations for the planned March 30 launch will be initiated March 27.

All launch vehicle and pad operations during the launch countdown are conducted from the blockhouse at Complex 36 by a joint government-industry team.

TYPICAL LAUNCH SEQUENCE FOR INTELSAT IV-A

Flight Events	Program Time (Seconds)	Earth Relative Velocity (Km/Hr	Mph)	Range Kilometers/Miles		Altitude Kilometers/Miles	
Liftoff	0	0	0	0	0	0	0
BECO	140.4	9,205	5,720	82.2	51.1	57.8	36.0
Booster Jettison	143.5	9,306	5,782	89.5	55.6	61.0	37.9
Insulation Panel Jettison	185.4	10,363	6,439	194.8	121.1	98.7	61.4
SECO/VECO	242.5	13,061	8,116	386.5	240.2	144.9	90.1
Centaur Separation	249.5	13,059	8,114	393.4	244.4	146.3	90.9
Centaur MES (1)	259.0	12,997	8,076	426.4	265.0	152.3	94.6
Nose Fairing Jettison	271.0	13,205	8,205	468.5	291.1	159.2	98.9
Centaur MECO (1)	620.2	28,029	17,416	2,278.0	1,415.5	189.2	117.5
Centaur MES (2)	1,493.0	26,531	16,490	8,611.8	5,351.1	558.9	347.3
Centaur MECO (2)	1,529.0	33,862	21,041	9,256.9	5,751.9	627.5	389.3
Spacecraft Separation	1,714.0	33,329	20,710	10,371.2	6,444.4	806.9	501.4
Reorient Centaur	1,719.0						
Start Blowdown	1,824.0						
End Blowdown	2,134.0						

ATLAS CENTAUR/INTELSAT IV-A TEAM

NASA Headquarters

John F. Yardley	Associate Administrator for Space Flight
Joseph B. Mahon	Director of Launch Vehicle and Propulsion Programs
F. R. Schmidt	Manager, Atlas Centaur

Lewis Research Center

Dr. Bernard Lubarsky	Acting Director
Dr. Seymour C. Himmel	Associate Director
Lawrence J. Ross	Director of Launch Vehicles
Richard E. Orezechowski	Intelsat Mission Project Engineer

Kennedy Space Center

Lee R. Scherer	Director
Gerald D. Griffin	Deputy Director
Dr. Walter J. Kapryan	Director, Space Vehicles Operations
George F. Page	Director, Expendable Vehicles
John D. Gossett	Chief, Centaur Operations
Creighton A. Terhune	Chief Engineer, Atlas Centaur
Floyd Currington	Spacecraft Coordinator

-more-

COMSAT

Dr. Joseph V. Charyk	President
Eugene T. Jilg	Assistant Vice President Engineering
Allen M. McCaskill	Manager, Launch Vehicles

Hughes Aircraft Co.

A. T. Owens	Intelsat IV-A Project Manager

CONTRACTORS

General Dynamics/Convair San Diego, Calif.	Atlas Centaur launch vehicle
Honeywell Aerospace Division St. Petersburg, Fla.	Centaur guidance inertial measurement group
Pratt and Whitney West Palm Beach, Fla.	Centaur RL-10 engines
Teledyne Industries, Inc. Northridge, Calif.	Digital computer unit/PCM telemetry
Rocketdyne Division Rockwell International Corp. Canoga Park, Calif.	MA-5 propulsion systems

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NASA News

National Aeronautics and
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Washington, D.C. 20546
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RELEASE NO: 78-43

GM RECEIVES CONTRACT TO DEVELOP NEW MATERIALS FOR AUTO ENGINES

A contract to advance development of ceramic materials, fabrication techniques and components for use in new, energy efficient automobile gas turbine engines was awarded to Detroit Diesel Allison Division of General Motors Corp., Indianapolis, Ind. The $43 million contract was awarded by NASA's Lewis Research Center, Cleveland, Ohio, in support of the U.S. Department of Energy.

The contract award extends an effort started under an earlier contract and will continue through 1983. The contract plans call for applications of special materials composed of elements such as silicon, nitrogen and carbon which are available in abundance.

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Mailed:
March 15, 1978

These materials will be designed into components used in gas turbine engines, techniques will be developed to fabricate the components, and the new components will be integrated into advanced turbine engine hardware.

Allison will also test the components individually and in turbine engines to verify the developments, material performance and the improvements expected with their use. Ceramic components offer the potential of significantly improving fuel economy of gas turbine engines while providing the potential for low cost engine production. A successful development could accelerate the introduction of the gas turbine for automobiles and trucks, and provide potential benefits in stationary applications such as in electric power generation.

Work will be performed at the contractor's plant in Indianapolis. Lewis Research Center provides project management of the contract effort for the Department of Energy, which directs the gas turbine program.

-end-

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RELEASE NO: 78-44

NASA NAMES ASTRONAUT CREWS FOR EARLY SHUTTLE FLIGHTS

Four two-man crews have been selected to begin training for early orbital flights of the Space Shuttle. They are:

John W. Young, 47, commander; Robert L. Crippen, 40, pilot

Joe H. Engle, 45 , commander; Richard H. Truly, 40, pilot

Fred W. Haise, 45, commander; Jack R. Lousma, 42, pilot

Vance D. Brand, 46, commander; Charles G. Fullerton, 41, pilot

Young and Crippen will be the prime crew for the first orbital flight test (OFT-1) scheduled for launch from NASA's Kennedy Space Center, Fla., in the spring of 1979.

-more-

Mailed:
March 17, 1978

Engle and Truly will be their backup crew.

Flight assignments for the others named today will be made at a later date.

NASA plans a series of six orbital flight tests, each of increasing complexity, to check out the nation's first reusable spacecraft. On the first four flights, the 75-ton orbiter will return from space to an unpowered landing on a dry lakebed at NASA's Dryden Flight Research Center, Edwards, Calif. Thereafter, the spacecraft will return to a specially constructed runway at the Kennedy Center launch site.

NASA is currently considering a mission to boost Skylab into a higher orbit during one of the OFT flights. If the decision is made to implement that plan, prime and backup flight crews will be selected from those named today.

Young is Chief of the Astronaut Office and a veteran of four space flights. He was pilot of the first manned Gemini flight, Gemini 3, in 1965; command pilot of Gemini 10 in 1966; command module pilot of Apollo 10 in 1969; and commander of Apollo 16, a lunar landing mission in 1972. He has been a member of four backup crews. Young, a retired Navy captain, has been an astronaut since 1962.

-more-

Crippen will be making his first space flight. A Navy commander, he has been a NASA astronaut since 1969 when he was transferred from the cancelled USAF Manned Orbiting Laboratory program. Crippen was a crew member of the Skylab Medical Experiments Altitude Tests (SMEAT), a 56-day simulation of a Skylab mission. He was a member of astronaut support crews for Skylab and Apollo Soyuz Test Project missions.

Engle, an Air Force colonel, commanded one of the two crews which flew the Space Shuttle approach and landing tests in 1977. Prior to his selection as a NASA astronaut in 1966, he was a test pilot in the X-15 research program and had qualified for astronaut wings in X-15 rocket plane flights exceeding 50 miles altitude. Engle was backup lunar module pilot for the Apollo 14 mission.

Truly flew with Engle in the Shuttle approach and landing tests. He is a Navy commander and was a MOL astronaut prior to transferring to NASA in 1969. Truly was on astronaut support crews for Skylab and Apollo Soyuz missions.

Haise, a civilian, was lunar module pilot for Apollo 13 in 1970 and commanded one of the two flight crews for the Shuttle approach and landing tests last year. He was backup lunar module pilot for the Apollo 8 and 11 missions and backup spacecraft commander for Apollo 16.

Haise became an astronaut in 1966 after several years as a NASA research pilot.

Lousma, a Marine Corps lieutenant colonel, was pilot for Skylab 3 in 1973. He was backup docking module pilot for the Apollo Soyuz mission and served on astronaut support crews for the Apollo 9, 10 and 13 missions. Lousma has been an astronaut since 1966.

Brand was command module pilot for the Apollo Soyuz mission in 1975. An astronaut since 1966, he was a support crewman for Apollos 8 and 13, backup command module pilot for Apollo 15 and backup commander for the Skylab 3 and 4 missions. Brand is a civilian.

Fullerton flew Shuttle approach and landing tests with Haise. An Air Force lieutenant colonel, he was assigned to the MOL program before becoming a NASA astronaut in 1969. Fullerton served on astronaut support crews for the Apollo 14 and 17 missions.

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RELEASE NO: 78-45

TILT ROTOR RESEARCH AIRCRAFT GOES TO AMES

A new aircraft combining features of both airplanes and helicopters is scheduled to arrive at NASA's Ames Research Center, Mountain View, Calif., this month.

The XV-15 Tilt Rotor Research Aircraft has wing-tip-mounted turbine engines which turn 7.6-meter (25-foot) prop rotors. The engine-prop rotor assembly can be tilted up for helicopter-type vertical takeoff and landing, or oriented forward in the normal manner for conventional flight as an airplane.

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Mailed:
March 20, 1978

Two research aircraft are being built under a joint program by Ames Center and the U.S. Army's Research and Technology Laboratories (AVRADCOM) at Moffett Field, Calif., by Bell Helicopter Textron, Fort Worth, Texas.

The first XV-15 to arrive at Ames has been modified for remote control operation and will undergo six weeks of testing in the Ames 12.2 by 24.4-m (40 by 80 ft.) wind tunnel. Flight testing of the number two aircraft at the Bell facilities in Forth Worth will begin following the wind tunnel tests.

Both aircraft will eventually be based at Ames for comprehensive evaluation of the tilt rotor concept by the Army and NASA. They will also serve as research aircraft to provide data for terminal area (airport) navigation, and vertical and short takeoff and landing programs underway at Ames.

Advantages of the tilt rotor concept are significant. While this type of aircraft can fly at speeds comparable to conventional fixed-wing turboprop planes, a terminal designed for vertical takeoffs and landings requires far less land area than needed for conventional airports and can, therefore, be located closer to population centers.

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For military use, tilt rotor aircraft can combine the tactical utility of helicopters with the advantages of longer range, higher speed transport aircraft. Potential future military missions include search and rescue, reconnaissance and surveillance, and troop transport.

The XV-15 cruise speed is about 550 kilometers per hour (340 miles per hour), twice as fast as present helicopters. It is designed to be much quieter than today's helicopters and turboprop planes.

A photograph to illustrate this news release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
Washington, DC 20546

Telephone No: 202/755-8366 Photo No: 78-H-128

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RELEASE NO: 78-46

NASA STUDIES AGRICULTURAL AIRCRAFT DESIGN

While many of its people still have their eyes set on the stars, researchers at NASA's Langley Research Center, Hampton, Va., are looking closer to Earth, focusing on the problems of agricultural aircraft.

First recorded use of an airplane in agriculture was Aug. 3, 1921, when a grove of trees was treated for an infestation of caterpillars. The test was successful and commercial dusting activity took off in a cloud of spray. By 1930, about 25 companies were operating with about 100 airplanes. By 1950, those numbers grew to 2,000 companies and 5,000 airplanes.

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Mailed:
March 20, 1978

Until 1950 airplanes had to be converted from some other purpose for agricultural use. Military trainers were the most widely used, and operators usually designed, built and installed dusting and spraying equipment themselves.

The first aircraft designed especially for agricultural use appeared in 1950. The industry has continued to grow. In 1976, there were approximately 8,500 fixed and rotary wing aircraft in agricultural service, flying about 2.5 million hours over some 250 million acres.

Agricultural aircraft have improved but they still rely on 1940s technology. The aerial applications industry recognizes this shortcoming and has asked NASA to study several problem areas. Drift, swath guidance, liquid and dry material distribution systems, and aircraft handling characteristics that cause pilot fatigue are some of the problems. Another major concern involves attempts to make the wake vortex of an airplane work for, rather than against, aerial applications. Aerodynamic concerns involve reducing drag for better fuel efficiency and developing appropriate high-lift concepts to improve takeoff, landing and turning performance.

Dr. Bruce Holmes, of the Safety and Operating Problems Branch, Flight Research Division, is manager of the Langley program.

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He says that during this year the problem areas "will be studied through the Vortex Research Facility, Full-Scale Wind Tunnel and actual flight tests."

In the Vortex Research Facility, small scale models of agricultural aircraft are tested to study interactions of the aircraft wake with dispersed spray and granular materials. These interactions contribute to two of the most serious problems facing the agricultural aircraft community, drift of toxic chemicals from target areas and nonuniform applications within a swath.

Test methods to simulate aerial applications are being developed in this facility. Baseline data will be collected to determine wake characteristics of agricultural aircraft. Tests will then be performed to measure airborne dispersal and ground distribution. The scale model will disperse polystyrene particles or glass beads as it passes through the test section. The particles will stick to double-sided tape covering the floor and will be counted with the help of a microscope.

Distribution will then be plotted and analyzed for effects on dispersal patterns caused by aircraft speed, height and geometry.

-more-

Finally, methods will be developed to modify aircraft wakes and dispersal systems to obtain interactions more favorable to wide, uniform swath distribution patterns and reduced drift.

In the Full Scale Tunnel, full scale aircraft and dispersal systems for both liquid and solid applications will be tested. Baseline data collected from present technology will be used in analyses to improve aircraft aerodynamics and dispersal system efficiency.

In the aerodynamics phase, performance and stability and control tests will be conducted and several modifications designed to provide overall system improvement will be examined. Modifications to be investigated include leading-edge slats for high-lift improvement, and ring cowl and wing-to-fuselage fairings for drag reduction and improved wake characteristics. Wake modification concepts such as vortex attenuating splines and winglets, shown to have possible beneficial effects on wake-dispersal interaction in the Vortex Research Facility, will be evaluated for possible aerodynamics advantages.

Tests will be conducted on aircraft and dispersal systems separately and as a single unit to provide data for performance estimates and to identify interference problems.

Laser spectrometer studies will be conducted to analyze liquid droplet breakup from spray nozzles in the airplane's wake. The ultimate goal of this research is development of nozzle technology for improved control of droplet sizes, reduced amounts of very fine droplets and reduced drift.

The flight tests are scheduled to begin in the fall of 1978 at Wallops Flight Center, Wallops Island, Va.

The aircraft used in the Full-Scale Tunnel and flight tests will be an Ayres Thrush S2R-800, one of the largest agricultural aircraft. The Thrush has 800 hp, carries 1,520 liters (400 gallons) of liquid and costs about $80,000. Originally loaned to Langley by Rockwell International, ownership of the aircraft and Thrush manufacturing rights were sold to the Ayres Company, New York, earlier this year.

A photograph to illustrate this news release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
Washington, D.C. 20546

Telephone No: 202/755-8366 Photo No: 78-H-129

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NASA Fact Sheet

National Aeronautics and
Space Administration

Washington, D.C. 20546
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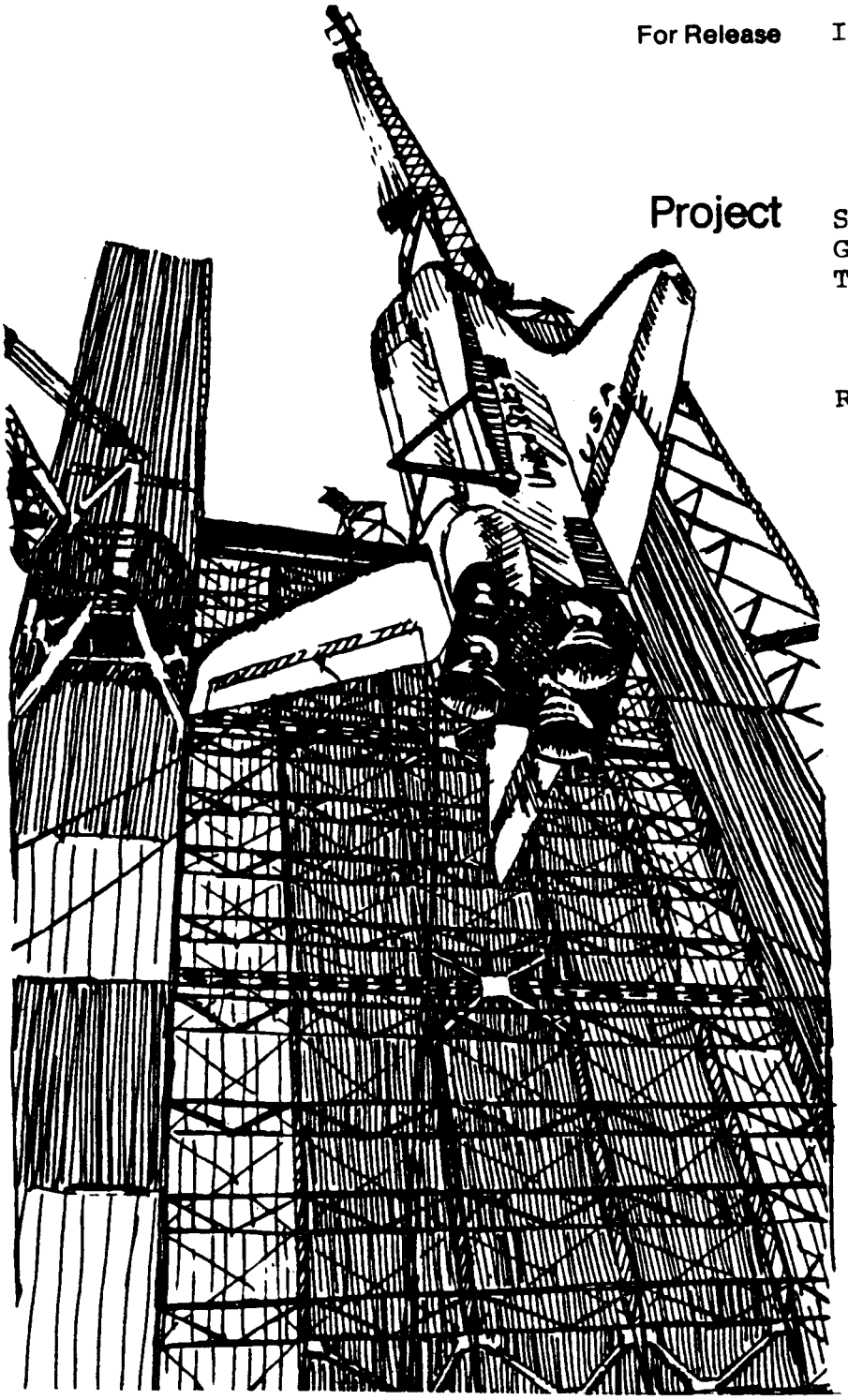

For Release IMMEDIATE

Project Space Shuttle Ground Vibration Tests

RELEASE NO: 78-47

March 1978

RELEASE NO: 78-47

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March 1978

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

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IMMEDIATE

Amos Crisp
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/453-0034)

RELEASE NO: 78-47

SHUTTLE BEING TESTED AT MARSHALL CENTER

America's spaceship of the future, the Space Shuttle, has arrived in Alabama to be assembled for the first time as a complete vehicle for ground vibration tests at NASA's Marshall Space Flight Center in Huntsville.

In a huge facility originally constructed for testing the Saturn V Moon rocket, engineers will evaluate the structural dynamics and their effect on the control system of the Shuttle.

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The component parts needed to make the Shuttle complete -- the orbiter, external tank and solid rocket boosters -- will be transported from California, Louisiana, Utah and other locations. Testing is expected to begin in early spring and continue for several months.

The tests are called MVGVT , an acronym which stands for Mated Vertical Ground Vibration Tests. The term vibration may be misleading. This is not a shaking test to learn how strong the vehicle is. Engineers at the Marshall Center will "float" the Shuttle in the center's tall test tower and apply vibrations to its exterior with exciters powered by amplifiers similar to those found on home stereo sets. Sensors placed along the skin at other locations record the characteristics of the vibrations as they pass from one area to another.

Information from these tests will allow the center to verify the system design and mathematical models that predict how the Shuttle's control system will react to the much more severe vibrations expected during launch and flight into orbit.

The ground vibration tests will continue through most of the year with pauses only to change the test configuration of the Space Shuttle vehicle.

The first test article configuration will include the orbiter and external tank to simulate the high altitude portion of a Shuttle mission after the solid rocket boosters have separated. The liquid oxygen tank of the external tank will be filled with smaller and smaller quantities of deionized water to simulate use of propellant by the main engines. The liquid hydrogen tank will be pressurized but empty.

For the second test configuration, solid rocket boosters filled with inert propellants will be stacked in the stand along with the orbiter and tank. This configuration simulates liftoff conditions. This will be the first stacking of all Space Shuttle components as they will appear for launch. Following this test series, all components will again be removed from the stand.

The third test configuration will be the same as the second except that the solid rocket boosters will be empty, simulating the portion of a Shuttle mission just prior to booster separation. Following this final test series, Shuttle components will be removed from the stand and prepared for return to points of origin.

-more-

Shuttle elements for the test will arrive during the next several months. The orbiter is the portion of the Shuttle which carries the crew and payload to Earth orbit and has performed to near perfection in flight tests in California. The same Boeing 747 aircraft which carried the orbiter aloft for the flight tests ferried it piggyback to the Marshall Center.

Arriving in segments by rail from Utah, the West Coast and other locations, the solid rocket boosters will be assembled at Marshall. The booster segments are expected to arrive at the center during the May-July time period. The largest Shuttle element, the external tank, assembled at New Orleans, arrived by barge on the Tennessee River early in March.

For flight, the boosters, external tank and orbiter will be joined to form one unit. The boosters are attached to the sides of the tank and the orbiter is fastened on top of the tank between the boosters. The boosters provide thrusting power during the first two minutes of flight. The main engines, pulling propellants from the external tank, burn for about the first eight minutes of flight.

The reusable Space Shuttle will become America's work-horse for future space missions. Its payload bay measures 4.57 meters (15 feet) in diameter and 18.28 m (60 ft.) in length and can accommodate payloads up to 29,484 kilograms (65,000 pounds) in low Earth orbit. The Shuttle will be able to take a variety of satellites to orbit, retrieve satellites and return them to the ground, or to repair satellites already in orbit.

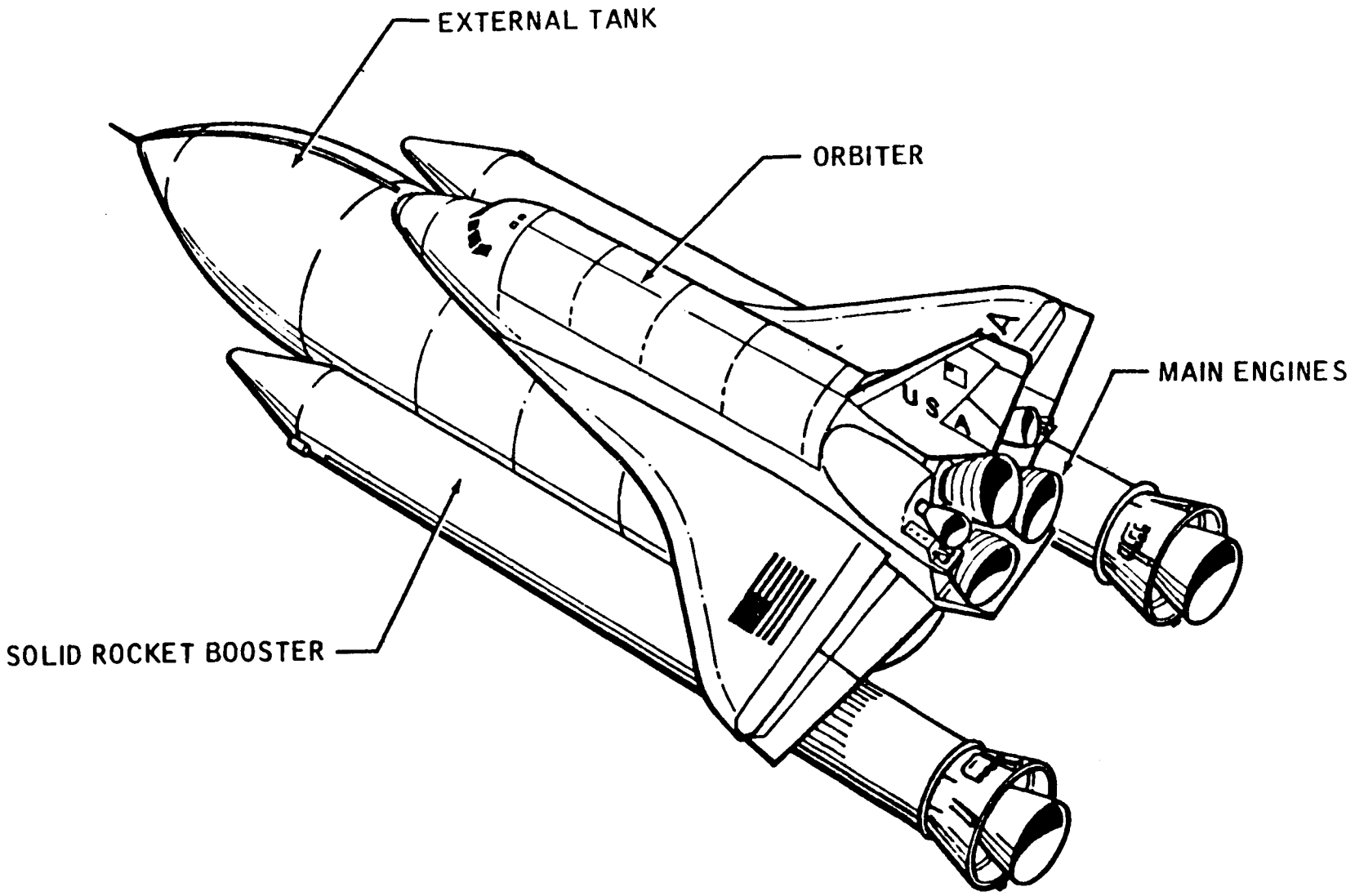
The Shuttle will also be the carrier vehicle for Space-lab, which consists of a shirtsleeve laboratory module for scientists to conduct orbital experiments in addition to pallets for experiment hardware which needs to be exposed to the space environment. Spacelab flights are scheduled to begin in 1980.

NASA's Johnson Space Center, Houston, Texas, has respon-sibility for the orbiter and the integration of all elements into the final vehicle.

The Marshall Center has the responsibility for design and development of the main engines, the external tank and the solid rocket boosters and some major testing of the vehicle and its components.

NASA's Kennedy Space Center, Fla., and Vandenberg Air Force Base, Calif., have been selected as the Shuttle launch and landing areas.

(END OF GENERAL RELEASE. BACKGROUND INFORMATION FOLLOWS.)


EXTERNAL TANK
ORBITER
MAIN ENGINES
SOLID ROCKET BOOSTER
USA

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MATED VERTICAL GROUND VIBRATION TEST MILESTONES -- 1978

Start test -- Orbiter and External Tank	April
Complete test -- Orbiter and External Tank	June
Start test -- Orbiter, External Tank and Solid Rocket Boosters Full	September
Complete test -- Orbiter, External Tank and Solid Rocket Boosters Full	September
Start test -- Orbiter, External Tank and Solid Rocket Boosters Empty	October
Complete testing	November

TEST CONFIGURATIONS

Test Article Configuration [1]	Test Condition	Time in Mission (Seconds)	Simulated LOX Level (Gallons) [2]	
1. Orbiter, Solid Rocket Boosters Full, External Tank [3]	1. Liftoff	T + 0	140,600	Shuttle Vehicle stacked and mated to simulate liftoff
2. Orbiter, Solid Rocket Boosters Empty, External Tank	2. Solid Rocket Booster Burnout	T + 125	101,000	Empty SRM segments simulate pre-SRB separation
3. Orbiter, External Tank	3. Boost (Main Engines only)	T + 125	101,000	Mated to simulate post SRB jettison
Orbiter, External Tank	4. Mid Boost	T + 301	45,750	Simulate conditions at main engines mid-burn
Orbiter, External Tank	5. End Boost	T + 477	3,450	Simulate conditions at main engines near burnout

[1]Three basic test article configurations used to create five test conditions

[2]Deionized corrosion inhibited water used to simulate liquid oxygen. Liquid hydrogen tank will be pressurized but empty

[3]SRB's filled with inert propellants

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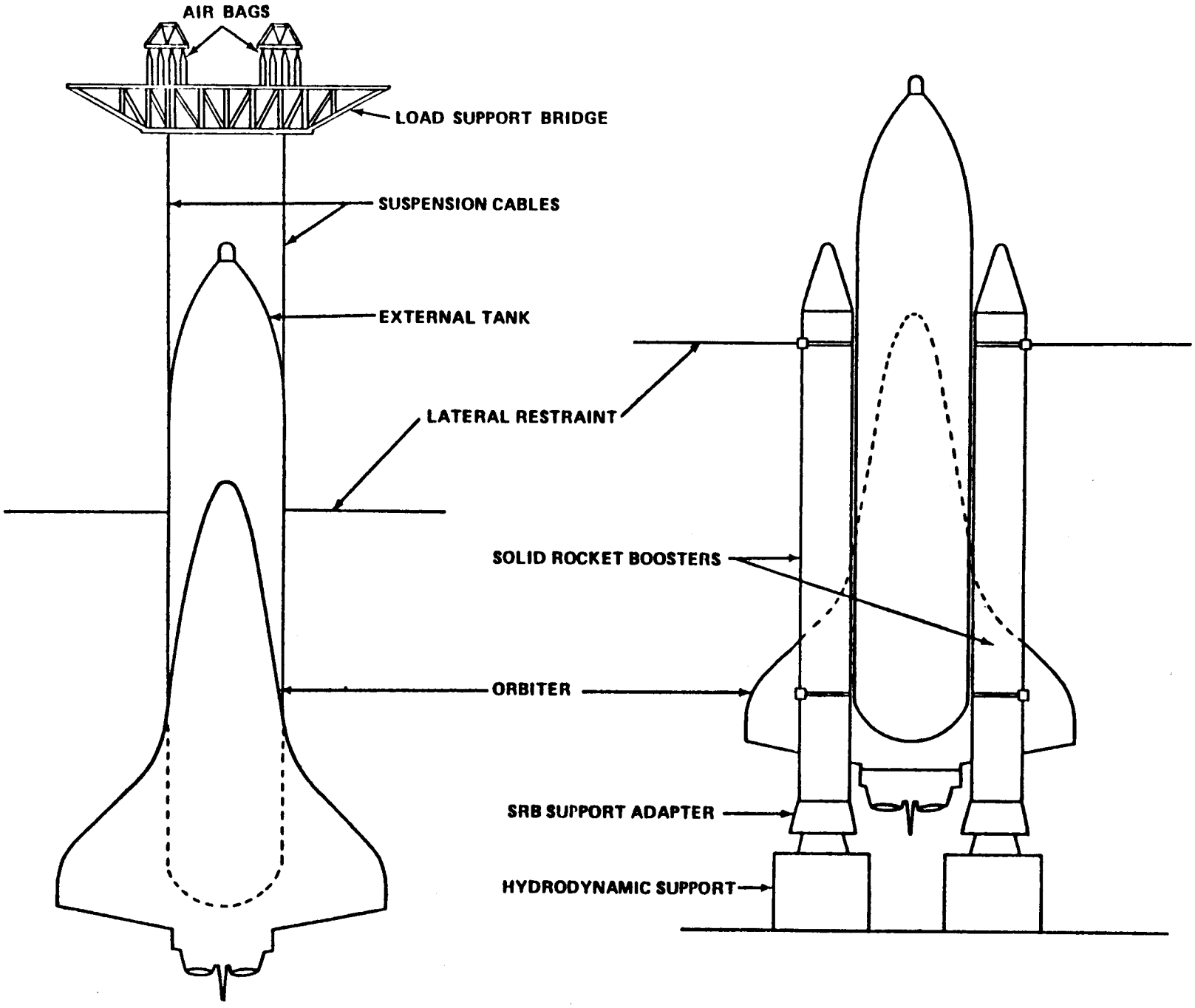
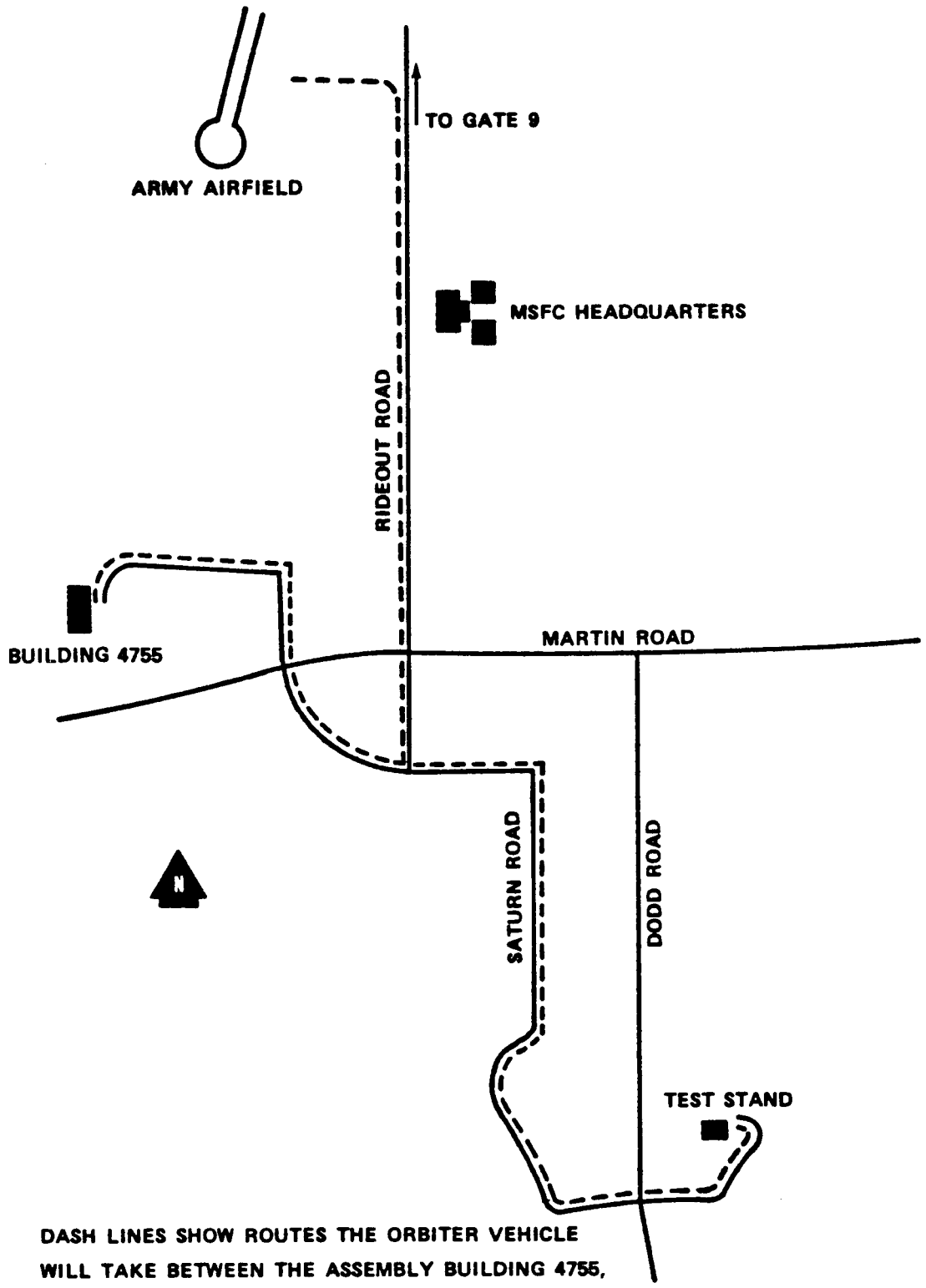


MATED VERTICAL GROUND VIBRATION TEST



DASH LINES SHOW ROUTES THE ORBITER VEHICLE WILL TAKE BETWEEN THE ASSEMBLY BUILDING 4755, THE TEST STAND AND THE AIRFIELD.

THE TEST FACILITY

The Space Shuttle will not be the first occupant of the 36-story-tall test tower where it will be installed. In fact, the test facility has an active history.

The dynamic test stand at NASA's Marshall Space Flight Center, Huntsville, Ala., was constructed originally for the huge Apollo/Saturn V launch vehicle.

Following its construction in 1964 and testing system installation in 1965, the dynamic stand was used in 1966 and 1967 for ground vibration testing of the Saturn V. The tests were conducted with the Apollo/Saturn V mounted vertically in the stand.

In the late 1960s, interior guide rails extending from the top to the bottom of the building were installed to provide Marshall experimenters with a low-cost method of obtaining brief periods of weightlessness. Scientific packages placed inside a capsule dropped along the guide rails for over 91.5 meters (300 feet) briefly achieving weightlessness. In 1972-73, tests involving the Skylab space station were conducted in the stand.

Because the Space Shuttle's configuration, an airplane-shaped orbiter, huge external tank for engine propellants and the long, cylindrical solid rocket boosters, differed so much from the cylindrical Saturn V, the newer vehicle would not fit into the original stand. Building a new Shuttle facility would have taken many millions of dollars. However, facility engineers at the Marshall Center were ready with plans to enlarge the Saturn stand at a cost far below the price of a new facility.

The basic foundation for a larger structure was already in place and the original tower was constructed so that a complete bay could be moved outward and reused to enlarge the structure with a minimum of new structural steel and siding. By salvaging the structural steel of the east bay, Marshall facility engineers achieved an estimated savings of $300,000 in that area alone.

A contract to enlarge the stand was awarded in late 1975 and the east side of the tower was extended 7.3 meters (24 feet) to provide a 7.3 x 29.9 m (24 x 98 ft.) addition so that the test bay would be large enough for the Space Shuttle.

During 1977, new work platforms to fit the Shuttle were added in addition to other support equipment for the tests.

Original dimensions of the stand were 29.9 x 29.9 m (98 x 98 ft.). As it now stands, it is 29.9 x 37.2 m (98 x 122 ft.) at the base and remains 109.7 m (360 ft.) high. In its extended position, a 181,440-kilogram (200-ton) derrick atop the facility reaches about 131 m (430 ft.) high. A 158,760-kg (175-ton) derrick is mounted on one side of the stand.

Modifications inside the stand include work platforms on eight levels shaped for access to the Space Shuttle configuration and two large hydrodynamic support stands for the solid rocket boosters.

Cost of facility modifications necessary to prepare the stand for Space Shuttle testing is estimated at about $2,880,000.

DYNAMIC TEST SUSPENSION SYSTEM

A unique suspension system with air bags and cables will be used to suspend the Space Shuttle's Orbiter Enterprise and external tank in the test tower for the first phase of the Shuttle ground tests at the Marshall Center during 1978.

The suspension system includes a large overhead truss which will be installed like a crossbeam between two test stand walls at the 65.8-m (216-ft.) level. The air bags and cables will be attached to the truss.

Although the Orbiter Enterprise and external tank will weigh about 544,320 kg (1.2 million pounds), this suspension system will allow the freedom of movement necessary for the acquisition of test data.

Suspending the orbiter and tank, which is the first phase of testing and scheduled to begin in April, duplicates as nearly as possible the flight conditions of the Space Shuttle from the time the solid rocket boosters drop off, two minutes into the flight, until the main engines shut off six minutes later. Following tests involving the entire Space Shuttle assembly will use a different suspension system.

Preparation for the first Shuttle test phase will begin with installation of the external tank in the stand. The tank will be temporarily affixed to the stand with knee braces. Then the Orbiter Enterprise will be lowered into place and mated to the external tank as it would be in an actual flight.

After the Enterprise is in place, engineers will install the suspension system overhead and attach the cables to the external tank. The upper ends of the cables are attached to the air bags. Air bags will be pressurized, and the knee braces removed. At this point, the Enterprise and the external tank will be suspended by the cables. Lateral restraints will prevent sideways movements of the configuration.

The suspension system is not needed for the second and third phases of the test, which use the solid rocket boosters, and will be removed.

Sperry Support Services, Huntsville, a division of Sperry Rand Corp., was responsible for development, design and manufacturing of the complete suspension system under contract to the Marshall Center. It was delivered to the Marshall Center Jan. 3, 1978.

The test support division of the Marshall Center's Test Laboratory was responsible for technical review of the suspension system development.

SHUTTLE TO BE STACKED ON HYDRODYNAMIC STANDS

Hydrodynamic stands which allow vertical, lateral and rotational movement will be used when the entire Space Shuttle is installed in a huge dynamic test stand for the second and third phases of the Shuttle ground tests at the Marshall Center during 1978.

Four stands will be used, two under each solid rocket booster. Each stand contains a cylinder and piston, with bearings installed on top of each piston. Together, this hardware provides for freedom of movement of the Space Shuttle Orbiter, external tank and solid rocket boosters. The stands will support a total weight of about 1.89 million kg (4 million lb.) when the solid rocket boosters are loaded with inert propellants. When the boosters are empty, the total weight on the stands is reduced to about 623,700 kg (1.5 million lb.).

Under test conditions, the cylinders will be pressurized to about 105,450 grams/sq cm (1,500 psi) and charged with about 3,785 liters (1,000 gallons) of a special type of oil. The bearings atop the pistons create the "floating" characteristics desired for the tests.

During the first phase of the test, the hydrodynamic stands will not be used. Only the orbiter and external tank will be installed in the test tower and suspended from a large air bag system located inside a crossbeam.

For the second test phase, the solid rocket boosters, filled with inert propellants, will be stacked inside the test facility on top of the hydrodynamic stands. Then the external tank will be attached to the boosters, and the orbiter will be mated to the external tank.

The third test phase will be the same as Test Phase Two except that the solid rocket booster will be empty.

The hydrodynamic stands, originally used in dynamic testing the Apollo Saturn V vehicle, have been refurbished and modified for the Shuttle tests. Marshall Center engineers estimate that the refurbishment and modification costs were about one-fourth the cost of a new system. Martin Marietta Aerospace, Denver Division, prepared the stands for the Shuttle tests, under contract to the Marshall Center.

HOW SHUTTLE IS VIBRATED

A key element in Space Shuttle ground vibration testing at the Marshall Center during 1978 will be the system that applies vibrations to the Shuttle while it sits vertically in a 109.7-m (360-ft.) tall dynamic test stand. Called the Shuttle Modal Test and Analysis System (SMTAS), this system can provide the required vibrational cycle and force inputs as well as acquire the response data from the vehicle.

The SMTAS will provide automatic control of up to 24 preselected shaker channels from the available 36 68-kg (150-lb.) shakers and 20 953.5-kg (1,000-lb.) shakers which are used to apply simultaneously precise excitation forces at preselected points on the Space Shuttle.

The shakers will be affixed by soft mounts to the test facility structure. Shaker rods will extend to the Space Shuttle and be attached to it at hard points over spars, ribs or other structural elements but not over unsupported skin surfaces. To protect the Shuttle hardware, the SMTAS is capable of manual or automatic cutoff.

The shakers are electrodynamic. The SMTAS will provide the drive amplifiers to control the force -- how hard the rods push and pull -- and the frequency, or rate of vibration.

While the major part of the data will be acquired by the SMTAS, data will also be recorded through test facility channels.

Data acquisition will be the responsibility of the Space Division, Rockwell International, under contract to NASA's Johnson Space Center, Houston.

TEST SUPPORT RESPONSIBILITIES

Test Hardware	
Orbiter	Rockwell International Space Division
External Tank	Martin Marietta Corp.
Solid Rocket Boosters	Marshall Space Flight Center
Solid Rocket Motors	Thiokol Chemical Corp.
Orbiter Support	
Ferry Flight to Marshall Center	Johnson Space Center
Mate-Demate	Kennedy Space Center
Ground Transportation	Marshall Center/Contractor's Cargo
Preparation for Test	Rockwell International
External Tank Support	
Ground Transportation	Marshall Space Flight Center/ Martin Marietta Corp.
Preparation for Test	Martin Marietta Corp.
Solid Rocket Booster Support	
Ground Transportation	Marshall Space Flight Center
Preparation for Test	United Space Boosters, Inc.

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Installation in Test Stand (overall responsibility Marshall Space Flight Center)

Hoisting Operations	Bendix Corp.
Stacking of SRBs	United Space Boosters, Inc./ Thiokol Chemical Corp.
Mating of External Tank	Martin Marietta Corp.
Mating of Orbiter	Rockwell International

Mated Vertical Ground Vibration Tests

Test Direction	Marshall Space Flight Center
Vibration and Data Acquistion	Marshall Space Flight Center/ Rockwell International/ Johnson Space Center

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NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
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For Release:

IMMEDIATE

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RELEASE NO: 78-48

NASA, DOE AWARD CONTRACT FOR STIRLING ENGINE DEVELOPMENT

NASA and the Department of Energy (DOE) have jointly announced the signing of a contract with Mechanical Technology, Inc. (MTI) of Latham, N.Y., to develop the Stirling engine for passenger cars.

The contract, awarded through NASA, provides for a major review and assessment at the end of 18 months. Maximum value of the contract which could run seven and one-half years is $95 million.

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Mailed:
March 27, 1978

This is the second Stirling engine development contract funded as part of DOE's effort to develop alternative automobile engine systems. The first was signed with the Ford Motor Co. last September.

The two competitive engine development teams, MTI and Ford, together with various engine technology development contractors and the Stirling Engine Project Office at NASA's Lewis Research Center, Cleveland, Ohio, make up the DOE Stirling Engine Development Program. Lewis Center provides project management for the DOE program and conducts supporting in-house research.

The contract with MTI calls for development of a complete Stirling engine system, engine performance data and production cost information that are needed by the automobile industry so that it can determine the feasibility of putting the engine into commercial production. Other members of the team led by MTI are United Stirling of Sweden (USS), Malmo, Sweden; and AM General, a wholly owned subsidiary of American Motors Corp., Detroit, Mich.

The Stirling engine has the potential of providing high fuel efficiency, flexibility of choice of fuels, inherently low noise and pollution emissions and good driving characteristics.

A Stirling-powered automobile is expected to be at least 30 per cent more fuel efficient than current vehicles yet give similar road performance. Potentially the Stirling cycle could be even more efficient as technical improvements are made.

Under the MTI contract, three generations of Stirling engines are to be developed and tested. The baseline engine, developed earlier by USS, serves as the proven hardware starting point on which the fuel economy, performance, reliability and weight and cost improvements are to be made, demonstrated and documented.

Approximately half the contract funds will be paid to MTI, which is responsible for program management and business development, technology transfer, component and analytical tool development and licensing. USS is responsible for developing and supplying engines and components for test and evaluation and will receive about one-third of the contract funds. The balance will go to AM General and others. AM General is responsible for engine-vehicle integration, test and evaluation, auto marketing and compiling trend information.

The contract calls for transfer of Stirling engine technology to a U.S. engine manufacturer and for royalties to be paid to the U.S. Government until two and one-fourth times the contract costs have been recovered.

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NASA Fact Sheet

National Aeronautics and
Space Administration

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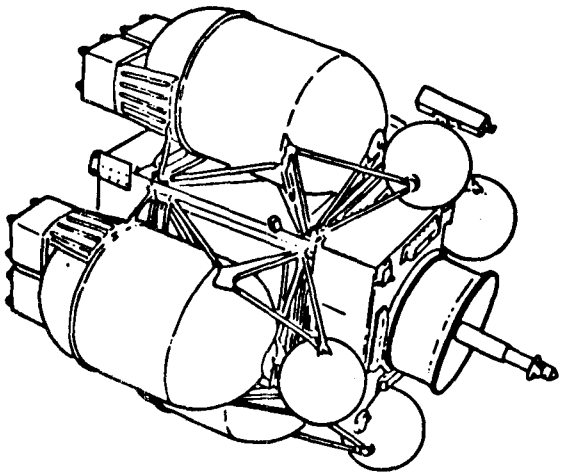

For Release IMMEDIATE

Project Teleoperator
Retrieval System

RELEASE NO: 78-49

Contents

Mailed:
March 31, 1978

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

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IMMEDIATE

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RELEASE NO: 78-49

NASA DEVELOPS TELEOPERATOR RETRIEVAL SYSTEM

Background

A Teleoperator Retrieval System (TRS) is being developed by NASA for first use in late 1979. Ordered by the NASA administrator in late October 1977, the retrieval system's first assignment will be either to re-boost the Skylab orbiting space laboratory to a higher orbit or to de-orbit it to a remote ocean area. The decision to re-boost or de-orbit is expected early in 1979.

NASA's Marshall Space Flight Center, Huntsville., Ala., was assigned management responsibility for TRS development in October 1977.

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The design concept has evolved from teleoperator supporting research and development that has been underway since the mid-1960s. Hardware fabricated by the Marshall Center as part of this development has been used to validate subsystem design and to develop control and operation techniques.

Anticipated long-range usefulness of the TRS for payload survey, stabilization, retrieval and delivery missions; its recovery and re-use capability; and its adaptability for the Skylab re-boost/de-orbit mission; led to its selection.

Preliminary design was initiated in November 1977 under a contract with Martin Marietta Corp., Denver Division. Negotiations for a complete development contract with Martin Marietta are scheduled to be completed by April 1, 1978. Estimated total costs are about $35 million.

Description

The TRS has a central core with its own propulsion system. It is designed to accommodate strap-on kits for additional propulsion.

The core is equipped with a 24-nozzle attitude control system that provides six degrees of freedom in controlling the vehicle during rendezvous, docking and initial orientation. Its thrusters originally were designed for cold gas propulsion, but designers are now studying the possibility of using a lower cost hydrazine (hot gas) adaptation.

The strap-on propulsion kits contain a propulsion fuel tank and pressurant supply and eight hydrazine rocket engines.

Guidance and attitude control maneuvers can be controlled either through pre-programmed instruction in the core communication and data management computer, or through manual control by a Shuttle crew member, using support equipment in the orbiter. Rendezvous maneuvering and docking with the Skylab or any other objects in space would be accomplished remotely by the crew member, who can view the area around the docking adapter on a TV monitor.

A schedule allowing less than two years for development, plus the low cost objective, dictated maximum use of developed hardware. While the TRS structure and orbiter structure will be new designs, all other systems are designed almost completely with components that are either off-the-shelf qualified hardware from other programs, or are under contract and will be available, qualified and flown before the TRS is used.

Systems

The basic TRS core vehicle is box-like, 1.2 by 1.2 by 1.5 meters (4 by 4 by 5 feet), with a triad of attitude control thrusters on each of its eight corners. The thrusters, in the 2.25 to 4.5-kilograms (5 to 10-pound) range, will provide three-axis attitude control and backward and forward maneuverability.

The core houses a guidance, navigation and control system, a communications and data management system and a propellant tank. A docking system is mounted on the forward end of the core, together with two TV cameras.

A Skylab re-boost or de-orbit mission will require four strap-on propulsion kits. One kit, 0.9 m (3 ft.) in diameter and 1.5 m (5 ft.) long, will be attached to each of the four long sides of TRS core. Each kit will carry 680 kg (1,500 lb.) of hydrazine and each of its eight rocket engines will have a minimum of 111 newtons (25 lb.) of thrust, providing a total of at least 3,500 N (800 lb.) of thrust for the Skylab re-boost/de-orbit mission.

Many payload delivery missions will require only two strap-on kits.

Orbiter Command Station

The TRS communications and data management hardware in the orbiter will be located on the aft flight deck. Special hand controls, a TV monitor and other controls and displays are required here so that a crew member can remotely control or monitor the teleoperator through all phases of the mission.

The command station will be used for transmitting, receiving and processing telemetry to and from the TRS and to issue commands and receive TV pictures.

Skylab Re-Boost/De-Orbit Mission

The TRS will be mounted on a special support structure in the Shuttle's cargo bay for launch from NASA's Kennedy Space Center, Fla. The Shuttle will park in orbit in the vicinity of the Skylab's position.

The TRS will self-eject from the cargo bay and, using the core thrusters for propulsion, the orbiter crew member will accomplish the Skylab rendezvous and docking maneuver through the command station control system.

The TRS system is designed for docking with payloads having moderate dynamic motions, such as tumble, rolling and coning.

When docking is completed, the core thrusters will be used again to maneuver the Skylab into the proper attitude for re-boost or de-orbit. At this point, rockets of the four strap-on kits will be fired. Two burns of about 13.5 minutes each will be required for the re-boost mission, and one long burn of about 27 minutes will accomplish the de-orbit mission.

Following re-boost or de-orbit, the TRS will be separated from the Skylab and will be placed in an orbital storage mode for retrieval on a subsequent Shuttle flight.

Future TRS Uses

The TRS core vehicle will complement Shuttle orbiter capabilities for safe payload inspection and retrieval operations. Its compact, small size offers minimal cargo bay encroachment, as well as propellant savings for on-orbit maneuvering of payloads.

The core system is designed with a built-in versatility for growth applications. Growth kits, such as manipulators and steerable high gain antennas, can be added with minimum integration cost.

Typical of the growth applications are: payload retrieval at higher orbits than Shuttle is designed to achieve; large structure assembly; emergency payload repairs; and retrieval of unstable objects or space debris.

A photograph (artist's drawing) to illustrate this fact sheet release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

The Public Affairs Audio-Visual Office
Code LFB-10/NASA Headquarters
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NASA News

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RELEASE NO: 78-51

INDIAN TRIBES WILL CONFER WITH WASHINGTON OFFICIALS VIA SATELLITE

American Indians of the Far West are about to use a sophisticated United States-Canadian communications tool, the world's most powerful communications satellite, in one of the more unusual undertakings of its kind.

Tribes in Montana and New Mexico will link up via the satellite with each other and with Federal officials in Washington, D.C. Object: To transmit, receive and discuss information and views on such tribal concerns as culture, education and tribal policies.

Mailed:
March 31, 1978

- more -

The experimental satellite, known as the Communications Technology Satellite (CTS), provides two-way interactive video and audio communication among several remote ground sites, allowing participants at each site to view and confer with each other as though in the same room.

CTS operates in a new frequency band and at power levels 10 to 20 times higher than currently operating commercial communications satellites. Its key component, a powerful transmitter, was developed by NASA's Lewis Research Center, Cleveland, Ohio, which has responsibility for managing U.S. portions of the joint U.S.-Canadian satellite program.

The three-day, eight and one-half total hours of satellite broadcasting will take place April 10, 12 and 14. Principal sending and receiving points will be the Bureau of Indian Affairs facility at Crow Agency, Montana; the Pueblo Cultural Center at Albuquerque, New Mexico; and NASA Headquarters, Washington, D.C. On the second day, April 12, two California colleges -- Humboldt State College and California State University of Long Beach -- will join the network through facilities of NASA's Ames Research Center, Moffett Field, Calif.

Indian nations taking part in the broadcasts will be the Crow tribe and other tribes from the Northwestern part of the country and the All Indian Pueblo Council, Inc. and nearby tribes from the Southwest. Their participation will be led by tribal chairmen and council representatives from the Crow Agency area and governors from Indian communities in and around Albuquerque.

Apart from the satellite itself, two low-cost Earth terminals designed and built by the Lewis center will play important roles in making the two-way, long-distance transmissions possible. One, called the Portable Earth Terminal (PET), is a van-like vehicle whose equipment will broadcast and receive television and voice signals via the satellite to and from remote locations around the country. It will be stationed at Crow Agency, which is about 60 miles southeast of Billings, Mont.

The other ground terminal is a Transportable Earth Terminal (TET). It has capability for receiving video and sending and receiving audio signals and will be located near Albuquerque.

"Good results from this demonstration could lead to a pilot program of perhaps six months duration and beyond," Lewis Center's Deputy Director Bernard Lubarsky said.

Lewis, as the responsible NASA center for managing the CTS experiments in the U.S., alternates on an every-other-day basis with the Canadian government for scheduling of spacecraft broadcast time.

CTS, powered by solar panels providing more than 1000 watts of electric power, is now in its third year of operation. It was launched January 17, 1976 from Kennedy Space Center, Fla. The satellite is in geosynchronous orbit 22,300 miles above the Earth off the west coast of South America.

Some 21 long-term and 65 short-term U.S. experiments managed by Lewis Center have been logged to date using the satellite. They cover educational, business, medical, sociological and community service events and topics. Emergency use of the satellite was made last July to aid victims of flooding in the Johnstown, Pa. area.

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